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ABSTRACT

This book is designed to provide parents and other adult companions with activities to do with children on outdoor walks. The activities offer adults and children a shared learning experience and have been adapted from the children's education program at Habitat Institute for the Environment (Massachusetts). The activities are arranged seasonally, based on natural history events that can be observed during those particular seasons. Eight distinctly different seasons can be observed: late winter's quiet giants (trees in February and early March), subtle signs of early spring (late March and April), spring's dramatic changes (May and June), long days and warm nights of summer (July and August), summer's grand finale (September), forests in autumn (October), late autumn preparing for winter (November and early December), and snow (mid-December and January). Each seasonal section includes nature study activities that have a reasonably good chance of being done with success in that season. Within the seasonal sections, the activities are presented in random order. (JRH)

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let nature be the teacher

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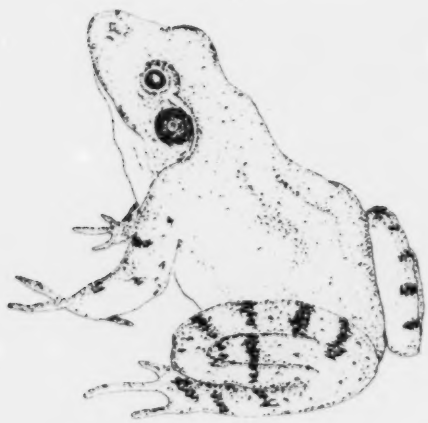

let nature be the teacher

LUCILLE N. GERTZ, DIRECTOR OF CHILDREN'S PROGRAMS

Seasonal Natural History Activities for Parents, and Other Educators to Share with Young Children

with Illustrations by Nancy N. Childs Teacher/Naturalist

HABITAT INSTITUTE FOR THE ENVIRONMENT
BELMONT, MASSACHUSETTS

This book is dedicated to the many curious children who have visited Habitat for classes, camps, and field trips. Their enthusiasm and energy inspired the development of many, many new activities. This is also dedicated to the parents and teachers who accompany these children on their outings. Much can be learned from their example of patience, excitement, and guidance.

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preface

This book is the second that Lucille Gertz has written at Habitat and, like the first, it is based on her long experience as a teacher of natural history for children. It also emphasizes much of the philosophy behind Habitat—that exploring and learning about nature can be an experience shared by children and adults together, not just something for children to learn from teachers trained in the area.

Many years ago, Ruth Churchill used to spend time with her children, observing with them the varied aspects of the natural world to be found on this place. Her love for and understanding of nature led her to manage the property for wildlife and inspired her children and family friends to have her estate preserved as a wildlife sanctuary and used for environmental education. Habitat continues her legacy—teaching children to appreciate, respect, and love the natural world.

Today, life is more pressured for both children and adults. There are few places for children to explore safely on their own; organized sports, TV, and Nintendo games fill leisure hours that are removed from the world of real sensory experience, and families have less time to do things together.

Children from early ages on like to poke around in the outdoor world but parents often don't know how to constructively encourage their natural curiosity or to answer their questions. Lucille's book, the result of working with a group of families over several years, provides just such an opportunity for children and adults to learn together. Full of activities, related information, and helpful suggestions, it can be picked up at any time of year and used for a brief interval or for a few hours. Grandparents, parents, extended family members, day care providers, or friends along with the children on these explorations, will find that shared discoveries lead to an increased appreciation of the natural world and a concern for its future.

Elizabeth Atkins
TEACHER/NATURALIST

HABITAT INSTITUTE FOR
THE ENVIRONMENT

acknowledgments

Many individuals offered their time, talents, and energy to this publication. I would like to extend my gratitude to them.

A note was placed in the Habitat newsletter during the summer of 1990 which stated that I was looking for parents and children to test activities which would eventually be compiled into a book. I was overwhelmed to hear from almost sixty families interested in the project. After an information exchange, there were still approximately thirty families available. They were asked to come monthly, try various seasonal activities, and provide feedback. The input from these families was invaluable. I am sincerely grateful to the following activity testers.

Phoebe Barnes, Jameela Pedicini (age 8), and Rafael Pedicini (5). Sharon Bauer, Elie Breakstone (9), and Sudip Peterson (10). Claire, Matthew (4), and Jeremy (1) Blake. Kerry, Anna (6), and Nina (9) Brandin. Sandy and Will (9) Fisher. Mary Fusani and Jana (5) and Andrea (6) Pollack. Nancy, Christina (6), and Richard (3) Gauron. Sharon, Ben (6), and Mia (2) Grossman. Vicky, Anthony (4), and Olivia (1) Hood. Linda Kaplan and Kirkland (5) Kraines. Anna Knight and William (2). Clare Walker Leslie and Eric Leslie (11). Ann and Hannah Mathes (5). Ginger, Teddy, and Christopher Miller. Ellen Mounteer and Kate (5) and Carl (2) Burdick. Emmy Novick, Becky (5) and Nicholas (2) Goldstein. Kathy, John, Sarah, and Emily Parkinson. Heather Parsons and Niko (8) and Alexander (3) Petite. Emily, Matthew (8), Elizabeth (6), and Rachel (3) Reardon. Anne, Daniel, and Hilary Ridman. Donna, McKane (5), and Sam (1) Sharff. Everett, Amy, Rachel (6), and Margot (4) Shorey. Jon, Karen, and Lindsay (4) Slote. Barbara Starr and Emily Starr-Phillips (5). Julie and Peter (4) Strong. Will and Emily (6) Twombly and Denise Siegal (6). Bjoins Weinerfelt and Joan Stone. Susan and Tom (4) Youmans.

Elisha Atkins, Executive Director at Habitat, Elizabeth Atkins, Teacher/Naturalist at Habitat, and Tom Tyning, Master Naturalist at Massachusetts Audubon Society, reviewed the text. Minnie Gertz proofread.

Special, deep appreciation to Nancy Childs for her breathtakingly beautiful customized illustrations, to Barbara Herzstein for her wonderful editing skills and supportive expertise, and to Lynn Sternbergh for her talents as designer.

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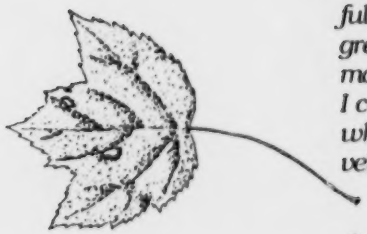
introduction FOR PARENTS



One of my earliest memories is set in the house where I lived until I was five years old. I do not remember much about the inside of the house, but I can still see the maple tree in the front yard and the large adjacent sandlot where I played. Getting home from kindergarten one spring day, I was surprised and delighted to find the maple tree full of newly opened, bright green leaves. I remember my mother lifting me up to where I could get a closer look and where I could reach their velvety texture and fresh smell.

A Note from the Author

As I create outdoor learning experiences for children, I try to journey back to my own childhood. Remembering perceptions, reactions, preferences, and skills I hold from memory helps when planning children's lessons and activities. I am fortunate in this regard for, while I can not memorize the minute factors that distinguish one warbler song from another, (a skill possessed by many of my colleagues), I can vividly recall what goes on in a child's world based on my own memories.

When I remember my earliest encounters with natural history, two factors are always present: there was something that excited me, and a parent or teacher either shared it with me or patiently allowed me to complete my observations. My clearest and most positive recollections always include the roles adults played. This adult-child sharing is critical.

I would like to fantasize about a childhood filled with close encounters with wild things, wilderness adventures, and family camping trips. It seems most professional naturalists had those childhood experiences, but I grew up in the suburbs. Nature came to me in common things: robins, squirrels, ants, acorns, and dandelions. It came to me not because of where I lived or what I did, but because I had learned, with the help of adults, to appreciate nature around me.

While exploring the yard of our new house, I found a seedling growing in a small pile of soil on top of a rock. Thinking it was out of place, I tried to pull it out. My father told me to let it keep growing. I remember him saying,

"Maybe it will grow into something special. Let's wait and see what it does." Over the next twenty years it grew into a tree and offered us many gifts: shade from the summer sun, wild cherries, the morning music of migrating birds resting and feasting, and a sense of amazement as the tree gradually split the huge rock in two. Several years ago, I visited and found my father, tired of removing cherry stains and bird droppings, had cut the tree down. While I was saddened to have lost my special tree, no one else even noticed it was gone. Until I reminded them they didn't even remember it being there. Perhaps I thought it was special because I had discovered it at the age of five, and my father shared the discovery with me.

Children grow up in varied surroundings, and urban and suburban areas are filled with many potential nature discoveries. The same basic natural history concepts are at work everywhere, no matter how tame or how wild the setting. With the guidance of an attentive adult, a young child can observe nature at work in a windowsill, on front steps, in back yards, and at local parks.

Taking regular discovery walks is what this book is all about, but it must be emphasized that the involvement of the parent with the child, and taking the time to enjoy these walks, are far more important than the wildness of the places you visit.

Spending time exploring outdoors with your child as your partner will always offer surprises. Be co-adventurers. When you learn together, there is no need for scientific answers or identifications. All you need is time to observe, share discoveries, draw pictures, ask questions, and watch for answers. Enjoy the unexpected. Get caught in the rain—you won't melt! Follow animal tracks in the snow. Stop and watch an insect lay its eggs. Visit the same place over and over again and discover how it changes from week to week.

About This Book

Activities can help children learn about natural history concepts. This book is

I have observed family groups improve their awareness of and appreciation for natural history over repeated outings. How parents feel about wildlife, however, hugely affects how comfortable children will be on an outing and what they will expect to see and do.

Few people know how to take a walk. The qualifications...are endurance, plain clothes, old shoes, an eye for nature, good humor, vast curiosity, good speech, good silence and nothing too much.

RALPH WALDO EMERSON

designed to provide parents and other adult companions with activities to do with children on outdoor walks. The activities offer you and your child a shared learning experience. You can be a naturalist or a novice—the key is involvement, not information. With your child as your partner, you can enjoy the activities and your time together.

The activities presented here have been adapted from the children's education program at Habitat Institute for the Environment. Throughout each season, students, school groups, families, and campers visit Habitat for nature classes, school field trips, and day camps. Through games, discovery walks, and activities, children become aware of natural history happenings on this suburban, eighty-acre wildlife sanctuary within the Greater Boston area.

Several families participated in a one-year study in which many of the activities presented here were tested. Each month, a group of parents tried the activities with their children. Their feedback greatly contributed to revisions of activity descriptions and background information.

The activities are arranged seasonally, based on natural history events that can be observed during those particular seasons. Eight distinctly different seasons can be observed: late winter's Quiet Giants (trees in February and early March), Subtle Signs of early spring (late March and April), spring's Dramatic Changes (May and June), Long Days and Warm Nights of summer (July and August), summer's Grand Finale (September), Forests in Autumn (October), late autumn Preparing for Winter (November and early December), and Snow (late December and January). Each seasonal section includes nature study activities that have a reasonably good chance of being done with success in that season. For example, a young child pretending to be a squirrel collecting acorns for winter will succeed only in autumn when acorns usually are abundant.

Within the seasonal sections, the activities are presented in random order. As a parent, you should select an activity that appeals to you and will appeal to your child. The activities you do and the way you do them will depend on many factors, including

weather, interesting natural distractions, the child's attention span and energy, and the unpredictability of natural events. (For example, there have been autumns when hardly an acorn could be found on the ground. Perhaps the oak trees produced fewer, or the squirrel population collecting was larger than usual, or the squirrels collected early.)

Your approach should focus on the child's experience. The amount of information you impart, its contents, and how you present it should be determined by your child's needs. An adult approach to a nature walk may focus on identifying wildflowers, for example, but that relates very little to the level of discovery of a young child. Walks taken together can be educational for both, but the intention here is to offer children a nature education experience which parents and children enjoy and share as partners.

As you prepare for an outing, do not hesitate to adapt a suggested activity to suit your own design or to try a type of activity that you would not normally try with your child. The parents who tested the activities often expressed their surprise at activities that worked well unexpectedly. They were just as surprised when activities they assumed would work well for their children did not. If you plan extra activities and vary their paces (active and passive) and approaches (investigative, role-playing, observational, etc.), the chance for smooth, fun-filled, successful nature walks will be greater.

One day in a shopping mall at age nine, I made a memorable wildlife observation. As my family of seven prepared to leave for home, and we were readying ourselves in the foyer of a department store, I saw a fairly large white moth fly into a corner of a window and get caught in a spider web. The much smaller spider darted over to the fluttering moth and wrapped it by spinning silk around it until it no longer moved. The whole thing lasted less than one minute, but the impression it left on me was permanent. Spiders became fascinating predators, easily observed in my suburban world. From that point on, spiders in windowsills and bathrooms were not to be killed in my home. Instead, they were to be respectfully escorted back to the outdoors.

As the years go by we find ourselves telling them less and learning more from them. We also see that they learn better from our learning than they ever did learn from our telling.

POLLY BERRIEN BERENDS,
WHOLE CHILD/WHOLE PARENT

The way our current lifestyles are, we do not often have the luxury of letting our children use their innate curiosity to observe things. Our schedules force us to drive it out of them. On this observation walk, it has been strange to actually allow my son to stop and investigate everything. It has been a fun change to encourage it, instead of our usual state of being in a hurry.

HEATHER PARSONS

There may be times when you can watch exciting natural events and you will not need specific activity suggestions.. A migrating flock of birds or a turtle laying eggs are such events. There may be times when you are involved in an activity, but something more interesting occurs. For example, you may be looking closely at the forest floor when a hawk appears overhead. Natural events are exciting, and you should take advantage of every opportunity to observe them.

Keeping a Nature Notebook

All budding naturalists can benefit from keeping a journal of their nature studies. Drawings, lists of things seen, and descriptions of observations are ways your children can record their explorations. A nature notebook is a place for photographs, leaf rubbings, and illustrations. Any notebook or blank book can be used. It is a fun, organized way to keep a record of your experiences. It also helps improve observation, illustration, and writing skills.

Several activities included in this book suggest the use of a nature notebook. In late winter, for example, your child can trace a bud over several weeks and compare its changing size and shape over time.

Remind your child to take the nature notebook along on each outing and do a drawing or make a note of something interesting along the way. Encourage your child to use the nature notebook freely, not just when an activity suggests it.

Approaches to Outdoor Explorations with Children

There are some approaches, both logistical and philosophical, that can help make outings more enjoyable. Logistically, timing and equipment are important. Philosophically, attitude, approach, and flexibility are critical.

Simplify your baggage by dressing appropriately. Bring a snack, a water bottle, and the right clothing; and you and your child will be able to concentrate on your explorations, not on your physical comfort. No explorer, young or old, can stay interested in nature observations when they are hungry, thirsty, cold, hot, soggy, or suffering in uncomfortable clothing. Your adventure, of course, should

not be free from any contact with the elements, but, within reason, comfort makes a big difference in concentration and in pleasure. Carry your supplies in a knapsack or fanny pack so your hands will be free.

Before you start, consider timing. Going on a nature walk in a hurry defeats the purpose. Try to pick times that are flexible, where expanding and allowing time for exploring interesting distractions will not lead to rushing the activity or being late in returning. Pick relaxed times when your children are usually energetic. For a change, pick times when they do not expect an outing (on a rainy day, or at sunset for, example). If you go on a walk when it would normally be a meal time, bring snacks. For some families, a regular time works best. For others, a spontaneous adventure is most productive.

Children are often evaluated on a right/wrong basis, but this need not happen on a nature walk. Since you never know exactly what you will discover, these walks practically require spontaneity, freeing you from such pressures as seeing predetermined things or arriving at a specific destination by a certain time. The constant pressures we all have to get things done and to get to places on time can be left behind, for just a little while at least, when nature is the teacher. Enjoy the relaxed pace and the lack of specific expectations.

Notes for All Seasons

An aquaintance of mine once accompanied a naturalist on an early morning walk in heavy fog. The naturalist began the walk by saying, "My, what a beautiful, soft morning. How fortunate we are to be out today!" To this day, my acquaintance still feels lucky to take walks on "soft" days.

WEATHER

A homesteader wrote, "Weather is my constant companion. I feel closer to it than to my own children, for it is with me, controlling my life and my moods at all times." While most urban/suburban dwellers may feel closer to their children than to the weather, we are indeed "accompanied" by the weather each day.

It has been said that the difference between climate and weather is that climate is what we expect and weather is what we actually get.

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Indeed, climate is determined by compiling the averages of temperature, rainfall, humidity, and other atmospheric conditions over a long period of time, while weather refers to the daily set of conditions and changes in a certain place.

So let's talk about the weather. Weather is a common topic of conversation. Even people who spend much of their time in climate-controlled buildings talk about the weather. People often complain about any type of weather that includes any form of precipitation, humidity, cloudiness, or anything which is not mild, sunny, and fair. Television meteorologists practically apologize when rain, snow, or seasonal cold or hot temperatures are predicted. Even news stories of serious drought are often followed by apologetic rain forecasts.

In addition to being accustomed to disliking weather, we are also conditioned to resist being affected by it. Our buildings and cars keep us cool in the summer, warm in the winter, and dry at all times. Regardless of the road conditions, humidity, and comfort of the weather, we are expected to function at the same rate of productivity each day.

Weather has much more to offer than comfort and convenience. Precipitation (rain and snow) is the part of the water cycle from which we get fresh water. It fills reservoirs and waters crops. It supplies water to the green plants which in turn supply all the oxygen we breathe. (We are 65 percent water; an average adult body contains 50 quarts of water.) The water we need comes in the form of rain and snow. Wet weather is an important part of the water cycle, a system upon which we depend for our lives.

When we stop to think about our dependency on rain and snow, we can begin to break away from our antiweather conditioning. We can try to become a little more appreciative and a little less unhappy about it. On family outings taken rain or shine, we can act as role models, adapting to weather instead of wasting emotional energy being disappointed with it. Accepting this "constant companion" and enjoying your plans in various types of weather allow more outings and more diverse outdoor discoveries. Some scents, colors, textures, and

even animals are best observed in wet weather. So dress for the weather and have fun in it. After all, most of us do not shrink or melt when we get a little wet.

GOING ON A NATURE WALK

Any place you visit for a nature walk, be it a park, school yard, or private property which is open to you, can be considered a natural setting or sanctuary. A sanctuary is defined as a place of refuge and protection. Some areas are specifically designated as wildlife sanctuaries and some areas, not called sanctuaries, can serve the same purpose for wildlife. For nature walks, any area you have access to can become your own wildlife sanctuary to enjoy.

Setting realistic goals and having appropriate expectations will make your nature walk more satisfying and rewarding. You may see wild animals, but it is much more likely that you will find animal clues and signs. Clues and signs will always be there for you to discover. Animals are sometimes there and at other times are not to be found. Try to think of live animal sightings as a special occurrence—a bonus. That will avoid disappointment.

Wildlife sightings vary due to a number of factors. The time of day you visit is significant. Some places may be open to visitors from dawn to dusk, but most people visit in the middle of the day. Many animals such as raccoons, skunks, and owls are nocturnal: asleep during the day and active at night. It is unlikely you will see them in the day. Many other animals such as rabbits, foxes, and songbirds are crepuscular—active at dawn and dusk. You will have a better chance of seeing these animals on walks early or late in the day.

There are also seasonal considerations. In the autumn many bird species migrate south. Some mammals hibernate and others reduce their activity level to conserve energy during cold seasons. Amphibians, reptiles, and many invertebrates (insects, worms, and spiders, for example) remain inactive underground for the winter. Generally, there are fewer animals to see in the winter, but those that are active leave their footprints and other exciting clues in the snow and mud.

The noise you make will also affect your chances of seeing wild animals. Animals that are awake during your visit

So often, when a group of children from an urban area first come to our suburban wildlife sanctuary, their initial comments and questions indicate a real fear of a wild setting. Visiting children have asked, "Are there bears here?" "Will anything eat us?" "Do you have lions and tigers?"

Once in a while my father would find a praying mantis and show us. I always wanted to put it in a jar, but was instructed to leave it alone. All day I would visit it. Nothing in science fiction could compete with this creature.

will usually avoid you, especially if you are talking loudly or moving noisily. They will be frightened away and will hide from sight. The more quiet you are, the better your chances for seeing them.

A final consideration is that wildlife sanctuaries in suburban settings are usually tracts of land preserved in the middle of our ever-growing human population. Larger animals such as deer, bears, wildcats, birds of prey, otters, and wolves need to live in large undisturbed areas. As humans encroach on the boundaries of an undeveloped, natural area, these animals no longer have enough space to live there. Many types of animals do live at wildlife sanctuaries, but they will be limited to the species and numbers that can find ample food, water, shelter, and enough space suitably arranged for their needs. Most sanctuaries have lists of wildlife sightings and known inhabitants for people who are interested in what animals or plants might be seen.

If you do encounter any wild animals, enjoy the opportunity to observe them quietly. So much can be learned about animal behavior through observations. Resist the tendency to promote myths to your child such as calling an animal scary-looking, cute, or dangerous. Try not to anthropomorphize—that is, to pretend an animal is acting in ways characteristic of a human. Through observation, factual information, and appropriate actions around animals we can teach our children to be knowledgeable and respectful of the wild animals sharing our planet.

When walking in a natural setting, please remember: Do not disturb the resident animals or their habitats. Wild animals thrive best in their natural homes and should not be handled or removed. Their habitat should not be altered in any way. Disturbing birds or other animals may cause them to abandon their nests, leaving their young unprotected.

Do not uproot plants, pick flowers, or break tree branches. Vegetation is the primary source of food and shelter for the resident wildlife. In addition, picking wildflowers prevents them from seeding and may lead to species decline on that sanctuary. Wild plants also thrive best in their natural home and should be left growing there.

Walk only on designated trails. Trampling vegetation or disturbing logs or stones may damage or destroy the homes of small animals.

Take only memories, notes, and pictures. It is not appropriate to remove anything from a natural area as a souvenir.

Leave only footprints. Litter is unsightly for those who follow you and it can injure or kill wild animals if they eat it.

Observation Skills and Activities to Improve Them

Observation skills are useful in every aspect of life, but on a nature walk, these skills really separate the "naturalists" from the "walkers." If we can teach children to use observation skills, every walk can be filled with interesting and educational discoveries. The more we observe the same place through seasonal changes, the greater our awareness of natural history through the most impressive way—our own observations and experiences.

You can strengthen your child's observation skills, and your own, by playing any of the following observation games before or during a nature walk. Instructions for these activities and the activities that follow are addressed to you and your children as participants. You should feel free to adjust the instructions to fit your own situation or your child's interests.

WHAT DID I CHANGE?

Stand facing each other. One of you should close your eyes while the other changes three things on him- or herself. Suggestions: remove a wristwatch, unbutton a sweater, roll up your sleeves, etc. When the partner making the changes is ready, the other partner tries to identify the three changes that were made. You can then switch roles.

KIM'S GAME

This observation activity involves seeing and memorizing natural objects. Place a number of objects under a piece of cloth. Examples are pine cones, rocks, leaves, shells, and acorns. Lift the cloth and have your partner view the objects for ten to fifteen seconds, and then replace the cloth cover. Have your partner describe or name some of the objects. See which objects were easy to recall and try to figure out why. You can switch roles and have

your partner show you a set of special natural objects.

ONE-IN-THREE

Have your partner select three different natural objects and place them in front of you. The best objects are nonliving things such as fallen leaves, loose twigs, rocks, and pine cones. Your partner should select one of these objects, but not tell you which one. Using descriptive words, have your partner give you hints until you can correctly select the one object described. You can help by asking questions such as, "Is it dried up?" or "Does it have shiny specks?" Switch roles and play it again.

MYSTERY SOCK

A mystery sock can help create a "natural history mystery" for your fingertips, reminding us that observation skills can use senses other than eyesight. Place a nonliving natural object in a sock without letting your partner see what it is. Have your partner put her/his hand inside the sock and feel the object. You may want to demonstrate this first to show that it is safe to put a hand inside. Once your partner has felt the object, have him or her attempt to describe or identify it. (Young children can be asked to give a "feels like" word.) Ideal mystery sock objects are feathers, leaves, rocks, pine cones, milkweed silk, dried seeds, acorns, shells, and fuzzy twigs. Switch roles and let your partner offer you a fingertip mystery.

NATURAL SYMPHONY

Animals can often be heard even when they are difficult to see. In warm weather, for example, a meadow is full of musical birds resting in surrounding trees and shrubs, and insects hiding in the grass. These animals may be out of sight, but by playing this game it becomes obvious they are nearby. Sit somewhere comfortable together. To play this game, make a fist and listen quietly. For each different animal sound you hear, open one finger. Continue until you have all your fingers open. You can also listen for other natural sounds, like the wind or rustling leaves, or unnatural sounds, like airplanes or cars.

HUMAN CAMERAS

A special way to look at a place is by being a human camera. One partner should be the "camera" while the other partner is the "photographer." The camera should close its eyes (or "shutter")

and the photographer should keep both hands on the camera's shoulders for safe guidance. The photographer walks the camera to a nice picture, positions it, and squeezes the camera's shoulders. When the camera gets squeezed, it "takes a picture" by opening its eyes for a few seconds. The photographer should take three pictures, then switch roles. All pictures do not need to be taken standing up. Play with your camera. Be creative and give your camera some fun and unique pictures to take.

SCAVENGER HUNT

A scavenger hunt, or a walk in search of certain items, is a good plan for a walk. The purpose is to be observant enough to locate some of the objects, not to turn your walk into a pass/fail experience. Consider seasonal items such as acorns in the fall and buds [illegible]ning in the spring. Please do not collect the items. Here is an example of a scavenger hunt. You can also make up your own. There are other scavenger hunts with seasonal themes in the seasonal activities. These are excellent activities for any season because there are always things to find. It is fun to see how observant you can be on an outing.

UNNATURE TRAIL

Take your partner on an "unnature" walk. Before the walk, place objects outside on a trail or in any outdoor setting. Explain to your partner that objects which do not belong in the setting have been placed there for them to find. Try to place both easily seen items and those that would be very challenging to find. When the unnature trail is ready, have your partner walk along and try to find the objects which are out of place there. Discuss which things were the easiest to find and which were the most difficult. This can help us to understand the effect of camouflage, since those objects that blend in with the background are usually the most difficult to spot.

OBSERVATION WALK

Go on a short walk together with a specific focus. See how many things you can observe and share with each other. Sometimes you do not need to travel very far to see a wide variety of plants, animal signs, rocks, shapes, or other interesting features. Looking carefully is the key. Try taking an observation walk on your hands and knees. Try finding just colors or textures.

sensory SCAVENGER HUNT

something older than you

a camouflaged animal

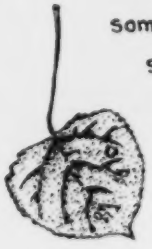
something with three or more colors on it

a sound

an animal home

something that smells good

something beautiful



something soft

something you have never seen before

draw it in your nature notebook

seasonal events

AND WAYS TO APPRECIATE THEM

quiet giants

FEBRUARY — EARLY MARCH

Late winter is a suitable beginning, considering how many subtle signs of newly emerging life abound. The silence of this season is deceiving. The winter landscape seems quiet and uneventful, but it offers a great opportunity to learn about cycles, trees, and winter wildlife. With the majority of leaves gone, branching patterns, buds, and nests are much easier to observe. Wildlife activity is easier to see and hear. Learning about trees in winter teaches us about their yearly growth and life cycles.

ACTIVITIES

ONE SPECIAL TREE

Find a special tree in a place you will return to several times over the next few seasons. Select one that has lost its leaves and has buds you can reach. Some dramatic changes can be witnessed during the next year as you visit this tree.

Tree Listening

Sit near the special tree and listen for sounds in the tree's "neighborhood" by playing the natural symphony game described in the observation skills section. You may hear various natural sounds such as bird calls, leaves rustling and branches moving in the wind, squirrel chatter, and more. There may be some unnatural sounds as well. Airplanes, nearby traffic, and other mechanical noises are often heard in natural settings. Make a list in your nature notebook of all the sounds heard near your tree.

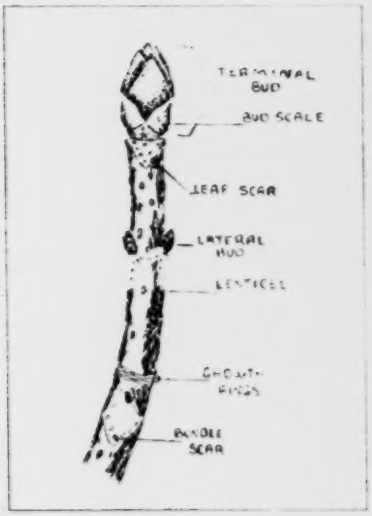
Tree Observations

Look closely at the tree. Try to find signs of wildlife activity such as nests, burrows, or holes where an animal might live. Look for protected areas in or near the tree where a small animal could hide. See if there are any buds, nuts, branches,

bark, or fruits that could be food sources for many animals. Take an observation walk around the tree. Make a list in your nature notebook of all the signs of wildlife you observe on or near your special tree.

Twigs and Branching

Look closely at one of the tree's twigs. Draw a picture of the twig in your nature notebook. Compare the tree's twig to this illustration and try to locate the parts shown here.

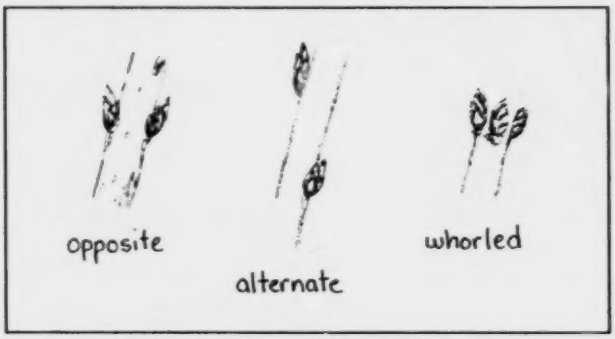


Look at some of the buds on your twig. Buds are formed in the fall before the leaves drop off. The bud contains all the leaves for next spring. Each type of tree has a characteristic bud shape and design. Match the bud on the end of your twig with one of the bud shapes shown here.

Select a terminal bud within easy reach. A terminal bud is the one found on the outermost tip of each twig. Tie a small piece of yarn around the twig it is on. Draw the size and shape of the terminal bud in your nature notebook. Leave the yarn tied on. Come back and visit throughout the next two to four months, drawing it in your nature notebook each time. The drawings will show the dramatic changes taking place during this time period.

Look on the twig for leaf scars. Leaf scars are where the leaf stems were attached to the twig. Within each leaf scar, you may be able to see tiny dots, or bundle scars, which are the ends of the veins that carried nutrients to the leaves. A hand lens is handy here. Leaf scars and bundle scars make a pattern unique to each tree species.

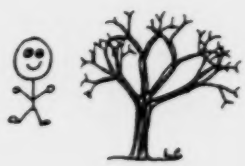
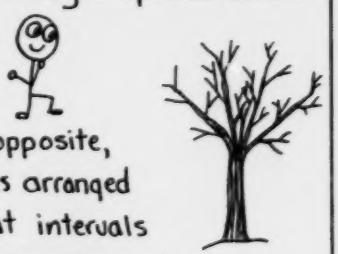
Try to match the leaf scar/ bundle scar pattern on the twig with the patterns shown here. Draw the leaf scar/bundle scar pattern in your nature notebook.



Trees also have different types of branching patterns. These patterns appear in the bud arrangement. You can learn the three types of branching patterns by playing this movement game. Imitate the three types with these motions.

Four common trees with opposite branching are maple, ash, dogwood, and horse chestnut. One way to remember them is by combining their first letters into "MAD Horse." Most other deciduous trees (those with broad leaves that drop in the fall) have alternate branch-

WHAT IS THE BRANCHING PATTERN OF YOUR TREE?

opposite	alternate	whorled
stand with arms and legs wide apart	stand with arms and legs going in alternate directions (example: right arm out, left leg out, other arm and leg straight up and down	Spin around in a circle
		
branches grow opposite from each other	not opposite, branches arranged singly at intervals along the stem	branches grow in whorled bunches around the trunk

ing. Most evergreens (trees with needles that do not drop all in one season) have whorled branching.

There is more information on trees, buds, and twigs on the following page.

Tree Bark

Look closely at the bark of your tree. Each tree species has a unique kind of bark. Think of four words to describe the bark of your special tree. Look closely and look from a distance.

Many insects overwinter in the crevices and between sections of tree bark. Sometimes you can see beetles or other insects moving about or sunning themselves on the bark on sunny winter days. Look for insects on the bark of your tree. Look also for holes and tiny tunnels. These are all signs of insects.

Make a bark rubbing of your tree. Place a blank piece of paper against the bark. (Make sure there are no insects under your paper.) While holding the paper in place, rub with the side of a dark crayon. The pattern of the bark will show on the paper.

Bid farewell to your special tree (until your next visit) and get to know some of your tree's neighbors.

Observation Walk

Take an observation walk around your tree's neighborhood. Look for similar types of trees and some different types as well.

Meeting Other Trees

Take a long piece of yarn or string and cut it so that it is equal in length to your height. Now take the length of string and compare it to the distance you can create by spreading your arms far apart. The two measurements should be the same, or very close. When you spread your arms wide apart, the distance between your fingertips should approximately equal your height. Now try to find a tree you can just manage to get your arms around so your fingertips can touch on the opposite side. If you can do this, you have found a tree that is as big around as you are tall.

Evergreens

You may notice that not all the trees have lost their leaves. Most of the trees that keep their leaves in winter have needle-shaped

TWIGS AND BUDS

horse chestnut
opposite buds
large terminal bud
buds sticky

ash
opposite buds
dome-shaped
terminal bud
crescent-shaped
bundle scars

red

sugar

maple
buds oval shaped
crescent-shaped leaf scars
three bundle scars

white

black

oak

alternate buds
clustered terminal
buds

flowering dogwood
opposite buds
onion-shaped flower
buds

beech
alternate buds
long, pointed buds

willow
alternate buds
single bud scale

hickory
alternate buds
large terminal bud and leaf scar

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leaves and are called evergreens. These needles have tough, waxy coats that help protect them from drying out in the cold winter wind. This also helps the tree shed snow, preventing branches from breaking under the weight. The large branches of these trees provide sheltered areas for wildlife. See if you can find a tree that has waxy, needle-shaped leaves. Pretend you are a small mammal seeking shelter under this type of tree during a snowstorm.

white pine
five needles in a bundle
(five letters in the word white)

red pine
two needles
in a bundle

pitch pine
three needles
in a bundle

TRY TO FIND ANY OF THE EVERGREEN TREES WITH THESE TYPES OF NEEDLES.

Age a Pine Tree

Find a small white pine. (Remember, five needles to a bunch.) From the ground up, count each level of whorled branches. Count scars where branches have broken off. Add to this number five more for the scars that are no longer visible from the first five years of the tree's life. Count the whorls going up the trunk. The distance between two whorls represents one year of growth. Determine the age of the tree you selected.

Look also for a white pine tree your age. Try to find a tree that had good growth some years and very little growth other years. Can you figure out what would cause that? Good growth factors: sun, moisture, nutrients. Poor growth factors: insects, deer, rabbits, and other herbivores ate too many leaves; drought, extended cold or windy weather limited growth.

eastern hemlock
flat, short needles
two white lines on
back of leaf

red cedar
small scale-like
needles, blue berries

yew
flat needles
red (poisonous) berries
shrub or small tree

TREES NEAR YOUR HOME

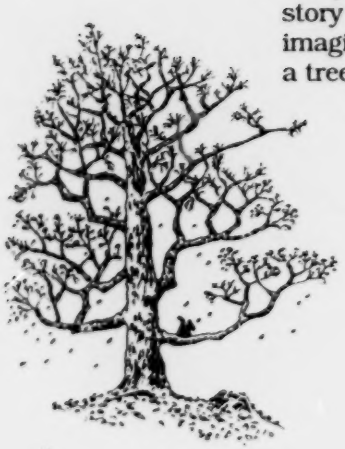
If you want to continue learning about trees, look more closely at the trees in your own neighborhood.

Make observations on the trees growing near your home. Do they have opposite, whorled, or alternate branching patterns?

Age a small pine tree on your street.

Do bark rubbings of several different types of trees in your neighborhood and compare them with one another.

Stand still for a whole minute, and then try to imagine what it would be like to be a tree and to stand still your whole life. Write a story about how you would imagine your life if you were a tree.



LATE MARCH – APRIL

subtle signs

Walks in the second half of March can offer you two different seasons. It can feel like winter, or it can feel like spring. To us, the difference lies in how warm or cold the air temperature feels. If you were a plant or a wild animal living outside, you would be preparing for spring even on the cold days. Plants and animals probably sense spring is on the way by the days growing longer. So, no matter how warm or cold it feels on the days you walk, there are many early spring discoveries to make because the plants and animals know what time of year it is—early spring!

Spring officially begins on the day of the vernal equinox, when the sun enters Aries, passing from the southern hemisphere to the northern hemisphere. The number of hours of daylight and darkness are equal on this day. It occurs around March 20. You can refer to an almanac that tells exactly how many minutes of daylight are added each day during this season.

A walk in early spring will offer many great observations. With so many signs of renewed plant and animal activity, it is easy to appreciate why so many people celebrate the arrival of this season. Many people anxiously await the familiar signs of spring: flocks of migrating birds, warm air temperatures, open water, insects buzzing, birds singing, and flowers blooming—but these come later in the season. Naturalists, however, can find a March or April day full of subtle signs of spring. Try to get out on a walk in early spring and you may be surprised to discover how many early signs of spring there are.

The following activities are designed for certain types of early spring days. Try the activities that seem appropriate tothe day, be it windy, muddy, or rainy.

ACTIVITIES

My favorite early spring memory has to be pussywillows. Where did these incredibly special things come from?

WIND This is a windy time of year. As you explore outdoors during this season, try to go out on a windy day. Try to notice the wind, to hear it and to feel it, to observe how it affects your surroundings.

Windy Day Scavenger Hunt

Go out on a windy day and try to find or feel some of the things shown on the Windy Day Scavenger Hunt, or make up your own.

Test the Wind Direction and Feel Wind Chill

You can tell the direction the wind is traveling by this simple test. Hold one index finger up and move it around in a circle so that it has faced each direction - north, east, south, and west. Next, wet your fingertip by licking it on the fingerprint side. Move it around in a circle again. Your finger should feel coldest when the wind hits the wet side, indicating the direction from which the wind is traveling.

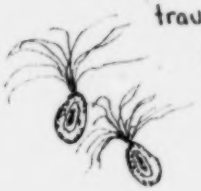
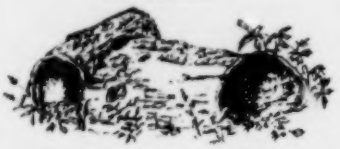
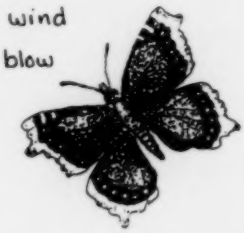
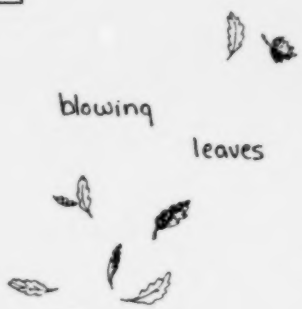
In addition to testing the wind direction, this shows that the combination of being wet and being exposed to wind is a chilling experience. This helps us to be aware of the need to dress to stay dry and protected from the wind. When warm-blooded animals (ones like us that stay the same temperature inside regardless of the outside temperature) such as otters, beavers, and water fowl, are continuously exposed to water and wind, they have adaptations for staying warm. These animals have extra fat layers under their fur. Ducks continuously oil their feathers so water will roll off them. People who spend a lot of time outside in cold, windy weather wear warm, windproof clothing. Animals that control their body temperatures using outside sources such as frogs, salamanders, and snakes, have developed various patterns of behavior to prevent themselves from getting too cold or too hot.

Here are some other ways to test wind direction. Blow bubbles outdoors and watch where the wind carries them. Release milkweed or dandelion seeds and watch where they go. Hold up a piece of thread or a hair and watch which way it moves.

Seeking Shelter from the Wind

While it is true that the wind helps many types of wildlife

SCAVENGER HUNT *wind*

☐ moving clouds	☐ seeds that travel in the wind 	☐ a place where an animal could find shelter from the wind 
☐ an insect that the wind could blow 	☐ blowing leaves 	☐ a bird flying in the wind
☐ the feeling of wind on your face	☐ grass blowing in the wind	☐ a windy sound

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WIND CHART

CALM
smoke and milkweed
seeds drift upwards
<1 mph

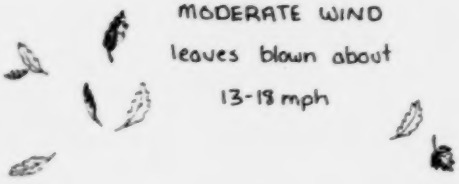
STRONG WIND
branches bend
25-31 mph

LIGHT AIR
smoke and milkweed
seeds drift sideways
1-3 mph

SEVERE WIND
twigs break off trees
39-46 mph

GENTLE BREEZE
leaves rustle
4-7mph

GALE
some trees fall
55-63 mph



MODERATE WIND
leaves blown about
13-18 mph

HURRICANE
severe damage
73+ mph

(seed dispersal, migrating birds, etc.) there are times when plants and animals need protection from it. See if you can find some places that are sheltered from the wind.

Classify the Wind

There are actually many classifications of wind. These are described on the chart on the opposite page. Next time you go out on a windy day, try to classify the wind.

How Is the Wind Useful?

There are very many ways in which wind is beneficial to us and to wildlife. Here are some of the benefits of wind. Can you think of more?

Seed dispersal

Bird migration

Helps butterflies travel

It makes snow drifts

It makes sailboats move

It keeps the weather changing

Helps predators smell and locate prey

Helps prey detect and flee from predators

Make a Wind Pinwheel

Supplies:

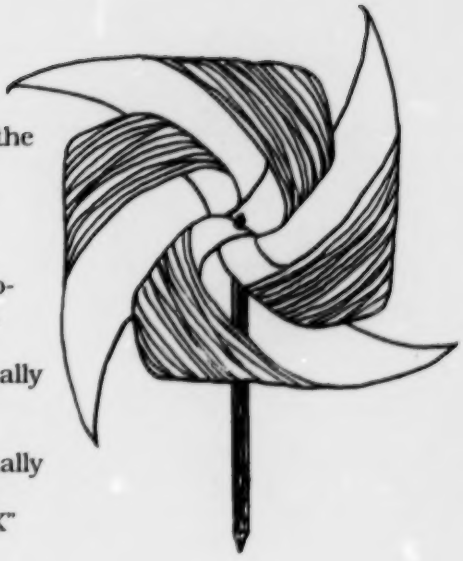
7 inch square piece of paper (typing or copy paper)
crayons or markers
scissors
pencil with an eraser on the end
push pin or straight pin

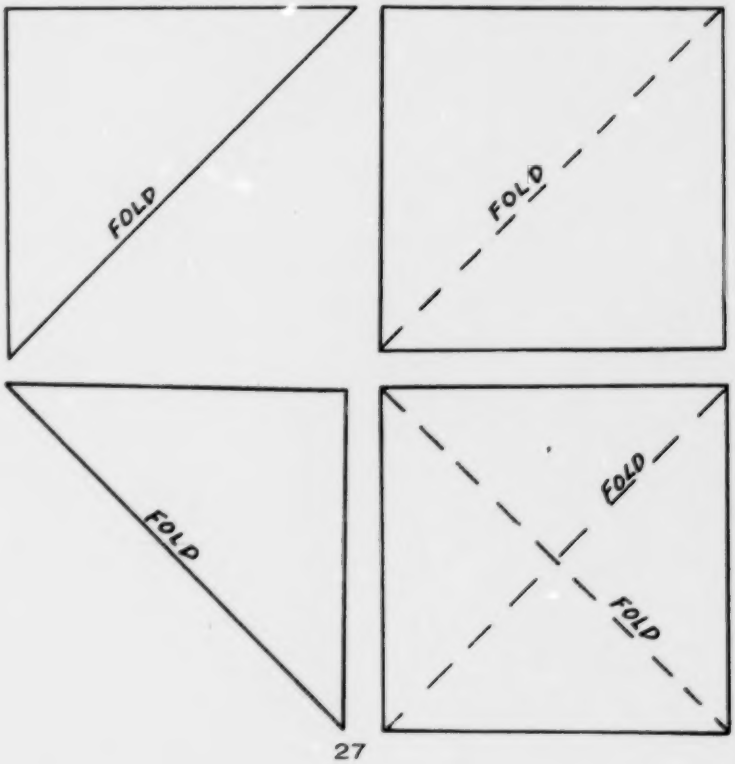
Directions:

1. Color the paper. Decorate each side differently.

2. Fold the paper diagonally as shown. Unfold.

3. Fold the paper diagonally again as shown. Unfold. You should see a large "X" folded in the paper.





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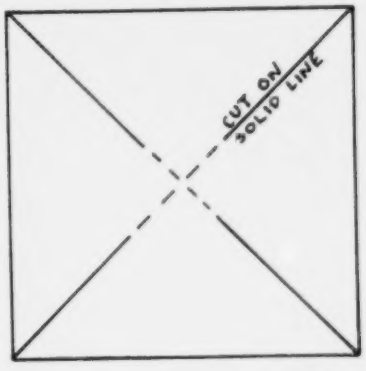
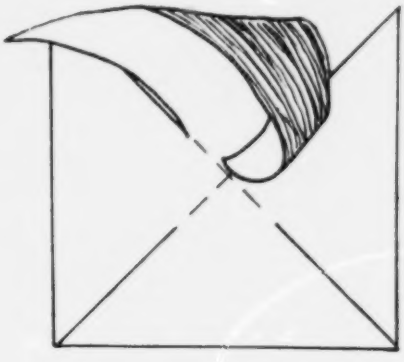
4. Cut along each folded line starting from the outside corner. Cut toward the center, stopping about one inch from the center.

5. Fold the right corner of each piece in to the center. Secure each corner tip to the center with the pin.





6. Push the tip of the pin into the pencil eraser.

7. Try out your pinwheel by blowing on it. Bring it out on a windy day.

Make a Wind Sock

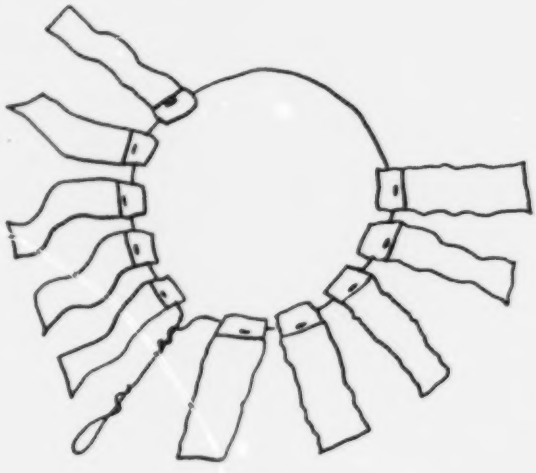
Supplies:
one wire clothes hanger
stapler or tape
crepe paper streamers or other light-weight materials such as tissue paper, thin cloth, or plastic grocery bags cut into strips

Directions:

1. Bend the hanger into a round shape as shown. Bend the handle closed for safety.

2. Staple or tape 8-10 crepe paper streamers to the hanger as shown. Each should be about 2 feet long.

3. Carry or hang your wind sock outside on a windy day.



Make a Traveling Maple Seed Helicopter

Supplies:
paper or index card
one small paper clip
scissors
crayons (optional)

Directions:

1. Copy the model shown on to the paper or index card.

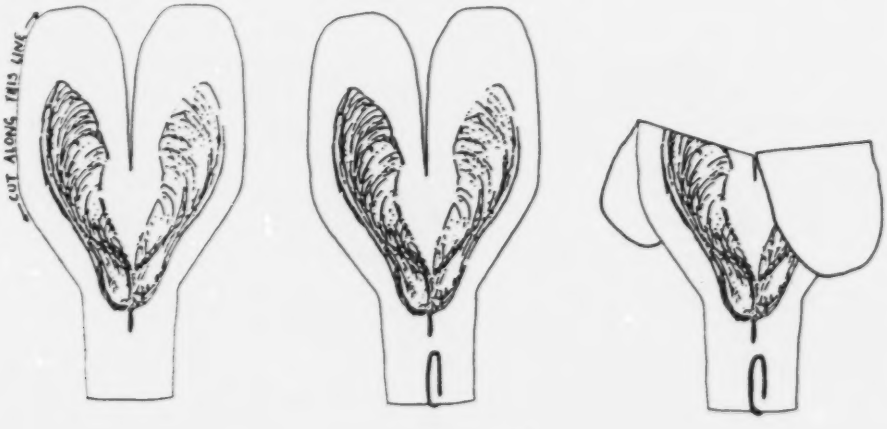
2. Color it in if desired.

3. Cut the shape as shown on the solid line.

4. Attach the paper clip as shown.

5. Bend the tips as shown.

6. Test your helicopter by dropping it from a raised hand and watching it twirl as it falls to the ground.



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MUD

One of the most dependable things about this season is mud, which forms as the ground thaws and spring rains come. Mud is a pretty amazing and fun thing. Here are a few activities for the budding "mudologist" in all of us. Wear washable clothes and go have fun.

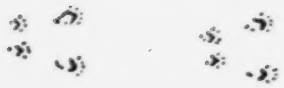
Skunk

Into the Depths

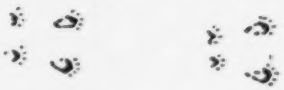
Bird

You can see how much of the ground has thawed by the depth and softness of the mud. To be a "mudologist" you will need a strong stick and some mud. See how far you can insert the stick into the mud. Mark the mud line on the stick with a pencil line or a scratch, and remove the stick. Next, try it in other muddy places. Compare the mud softness in a shady spot and a sunny spot. Compare mud on a walking trail and mud just off the trail to determine which is the deepest and which is the softest. Try to see how foot traffic on a trail affects the mud.

Deer



Gray Squirrel



Animal Tracks in the Mud

Animal tracks can often be found in mud. Look around and see if you can find any. Often tracks can be seen on the muddy banks of a pond or stream. These illustrations may help you to identify and interpret any tracks you find.

Raccoon

Many people complain when it rains, but a rainy day is really worth celebrating. Precipitation, mainly in the form of rain and snow, is the part of the water cycle from which we get all of our fresh water. It fills our reservoirs and waters our crops. It supplies water to the green plants, which in turn, supply the oxygen we breathe. Our bodies are about two thirds water; the average human adult body holds 50 quarts of water. The water we need comes to us in the form of rain and snow. Wet weather is an important part of the water cycle, and something we need. So next time it rains, go out and celebrate!

The Importance of Water

Think about water for a moment. We need water more than just about anything else. What are some things that water provides for you? Think about it carefully. Can you think of anything you eat, use, or wear that does not somehow require water?

The Water Cycle

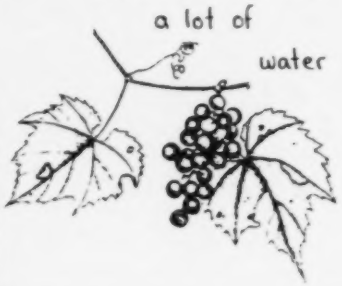
One magical thing about water is that it never goes away. Sometimes it disappears for a while, moving underground, or it evaporates into the atmosphere as clouds or fog. Glaciers, rivers, and oceans are all places where water can be stored. Even soil, plants, and animals store water temporarily. All the Earth's water is continuously cycling throughout the atmosphere and on the planet. The amount of water remains the same, but it changes form constantly.

To observe the evaporation part of the water cycle, try these activities. Draw a chalk outline around the outer edge of a puddle, once it stops raining. Go back and check the puddle a day later. Compare the current size of the puddle to the chalk outline from the previous day. Because some of the water has evaporated, the size of the puddle will be smaller. Another way to observe the effects of evaporation is to set a full cup of water somewhere in your house, out of the reach of pets and with the promise of all humans to leave it alone. Check the water level after a few days. The cup should be less than full because some of the water evaporated.

Rain Scavenger Hunt

Go out and find some of the things on the following page that are related to rain and water.

rain SCAVENGER HUNT

a place where an insect could stay dry	an animal that likes moist places	a rainy sound
a plant that holds a lot of water 	a place where a bird could take a bath	a place where an animal could stay dry
tracks in mud	something that sings in the rain	something that needs the rain

Make a Rain Painting

You can use rainwater to create a unique painting. First make a watercolor painting and let it dry. On a rainy day, place your painting outside so that falling rain will land on it. See what interesting features change when your painting is rained on. Another way to use rain for a painting is to collect rainwater and use it to wet your watercolor paints.

Collecting and Testing Rain

On a rainy day you can do any of these experiments or you can design your own.

Put out a container before the rain begins. When the rain ends, see how much collected in the container.

Pour some collected rainwater through a coffee filter and see if anything filters out of it.

Leave consistent amounts of collected rainwater outside in various open containers. Compare the rates of evaporation. Does the location of the container make a difference? Does the shape of the container make a difference?

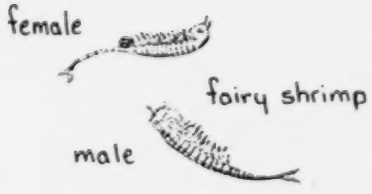
Put food coloring in some rainwater and leave it outside to evaporate. When it evaporated, did the coloring stay behind? Try this with salt, with drink crystals, and with other things that dissolve in water.

MAGICAL VERNAL POOLS

water strider

This is magic; I'm so glad to know about it. We found tiny water beetles, a red worm turning corkscrews, a fairy shrimp flailing about. Wet feet added to the adventure.

SHARON BAUER



Throughout woods and fields, alongside roads and walking trails, lies an early spring secret: vernal pools. These pools fill as melting snow and spring rains saturate the ground. Hollows and low areas flood, creating temporary ponds. A vernal pool is defined as a seasonal body of water occurring in the same location each spring ("vernal" means spring), holding water for at least two months, and containing certain species of animals in certain seasons. The definition is important because bodies of water fitting this description can be protected as wiidlife habitat in some states. (Massachusetts is one such state.)

Vernal pools occur in the same place each year, providing a critical habitat to species whose life cycles require annual flooding and evaporation. For example, fairy shrimp live their entire lives in the vernal pool. When the pool dries up, their eggs remain in the soil. When the pool once again fills in the fall or the following spring, the eggs get saturated and hatch. In the short time the pool is full, the shrimp mature, mate, and lay eggs.

In addition to the species whose entire life cycles require temporary aquatic habitats, many amphibians migrate to these pools to mate and lay eggs in the rich, productive waters. Fish and other larger animals cannot live in temporary pools, so the residents have few big predators as they develop quickly in their short-term home.

During this season, these temporarily full pools are teeming with life. Frog and salamander eggs and larvae, fairy shrimp and various other crustaceans, insects and other small animals are abundant. A cup full of water from one of these pools may contain dozens of different tiny animals.

Visit a vernal pool and gently sample the water for its tiny, active, and diverse residents. The illustrations here may assist you in identifying anything you find. Please be careful to return these tiny creatures to their home after briefly observing them.

Your local nature center or conservation organization can advise you on locating a vernal pool in your community. Once you locate a vernal pool, visit it again. In early summer, you may find

predaceous diving beetle

Its fun trying to find all these things. Lots of just ooohing and exclamations.

spotted salamander

wood frog

wood frogs and salamanders emerging from muddy water. In the late summer, you may find only mud. On a fall visit you may find autumn rains have filled it or it has completely dried up. Do not worry, though. Next year, when winter yields to spring, this magical pool will once again fill.

I loved this activity. The kids really got into the scavenger hunt spirit of it. At first we couldn't see any signs of spring, but the 'hunt' showed us how many there are when you look closely.

S H A R O N B A U E R

dragonfly

Early Signs of Spring Scavenger Hunt

Go on an early spring scavenger hunt. The activity on the next page may help you find some subtle, early signs of spring.

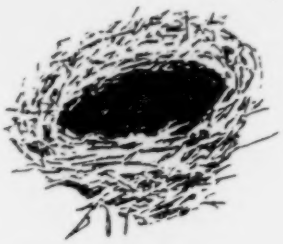
dragonfly nymph

caddisfly

caddisfly larva

early sings of spring

SCAVENGER HUNT

signs of nest building 	buds	a spring flower
three shades of green	a fresh smell	mud
a new bird sound	an early spring insect	a fiddle head (young fern)

M A Y — J U N E

dramatic changes

Many dramatic changes in the landscape occur in the spring. When the warm weather and long sunny days arrive, many plants and animals have much "work" to do during this season.

ACTIVITIES

Birds and mammals are getting ready for new families. They are busy with mating, nesting, and other activities that will create and protect their offspring. Insects, many of which awake from overwintering as eggs, must grow into larvae and eat the now abundant leaves so that they can pupate, develop into adults, and mate and lay eggs before the weather gets cold again.

Plants change in response to the season as well. Newly opened leaves spread out to catch the sunlight of longer days. Broad-leafed plants (as opposed to those with needles) have just the warm, sunny months to photosynthesize the sun's energy into food and store the extra food for growth and winter survival. Flowering plants must produce attractive, nectar-filled flowers, inviting insects and other animals to come sip nectar so that they will leave with pollen which will then get carried to other flowers of the same species.

Melting snow and ice, combined with early spring rains, have soaked the forests, meadows, ponds, and streams with important moisture. It is a brief, active period for most plants and animals, and we can witness many ways local wildlife have evolved to adapt to this temperate climate.

Few people need to be encouraged to go out for a walk during this season. For many, it is a favorite time of year and a favorite time to get outdoors to observe these exciting changes which are so abundant.

When spring arrives,
I feel . . .
Hopeful about life in general.
Eager to be outside.
Joyful.
Life starts over.
Happy.

My tummy changes from a winter feel to a spring feel. It feels like spring flowers and spring dirt.

RAFAEL PEDICINI

BIRDS

Robins were another type of spring magic. They appeared on the front lawn around the same time the maple buds began to swell up.

This is a time of year when migrating birds return to their summering grounds. You can see and hear the most birds early in the morning or late in the afternoon. Migrating birds most often travel at night and rest in the heat of the day. They feed at dawn and dusk, so that is when you can best see and hear them. Look and listen for them in meadows, near water, or near edges between forests, meadows, and wetlands. These edges, where two different habitats overlap or meet, generally offer more abundant wildlife cover, and therefore more wildlife. Such places, or any of the habitats they connect, would be ideal locations for playing the natural symphony game (described in observation skills section) early or late in the day.

When birds migrate, some follow landmarks like river valleys, mountain ridges, and coastlines. Others navigate at night using the pole star which does not appear to move. Still others navigate in the daytime using the sun and an internal clock that tells them where the sun should be as it moves east to west from dawn to dusk. Some migrating birds follow other birds. Here are three games to play in which you will pretend to be a migrating bird returning for the season.

I Have Wings

Spread your arms out like outstretched wings and flap them like a bird. Begin flapping as fast as a crow (two wing beats per second). Once you have managed this, try the wing beats of these other birds.

Robin 2.3 wing beats per second
Pigeon 3
Starling 4.5
Chickadee 27
Hummingbird 70

Where Do I Go?

Pretend to be a migrating bird trying to follow another bird. With your partner, try to communicate some navigational directions using only imaginary "bird" language. Try some "words" like these or make up your own.

"Chirp": Go to the left

"Caw": Go to the right

"Squawk": Go forward

"Cheep": Stop

"Honk": Danger - find a place to hide

Home Tweet Home

When migrating birds return to their summering grounds each spring, they have many tasks. They must establish a territory, defend their territory, attract a mate, and build a nest or repair an old one. Try to build your own bird nest in a field, along a walking trail, or on a tree branch. Using just loose grasses and sticks (no picking please), try to assemble a nest similar to one a song bird might build for its eggs and nestlings. Try to build one that would stay together in a storm. Think about how difficult it was for you to build this nest. Consider that a bird does this with just its feet and its beak.

Bird Scavenger Hunt

Try to find some of the things on the following page that are related to birds and their spring activities.

Many common mammals are easy to observe in their springtime behaviors. Look in oak trees for gray squirrels and in evergreens for red squirrels. You can watch them biting off small branches full of tiny oak leaves and buds. They bite off several, letting them fall to the ground, and then go down to collect and eat them. In a meadow in the early morning or at dusk you may see cottontail rabbits nibbling on fresh clover. Even if you do not see animals on a walk, there are signs left behind. Look for freshly chewed twigs and grasses, nesting sites, and droppings. In the following activities you can learn about some of the seasonal behaviors necessary for mammals to mate, establish territories, and to defend themselves and their young.

Mating Call

Mammals sometimes use certain sounds to attract mates. Select a mammal you wish to be and make up a sound you might use for calling a mate. This can be a purr, growl, grunt, bark, or similar animal sound. Separate from your partner by several yards and cover your eyes. Without looking, try to locate each other by using

birds SCAVENGER HUNT

something a bird could use to build a nest like this one

a plant a bird could eat

a place where a bird could find a drink of water

a bird on a tree

a bird singing

signs of a bird

a bird in flight

a tiny animal a bird could eat

a place where a bird could build a nest

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your mating call and moving toward the sound. When you touch your partner, you have located your mate. More pairs can play if each pair has a different call.

Scent Trail

Some animals establish territories by marking them with scents. Mammals may leave droppings, urine, or specially made scents on tree trunks, rocks, and other territorial boundaries to attract mates or to repel competitors. You can set up a scent-marked territory using any strong smelling extract such as lemon, cedar, or vanilla oil. In a small area of trees or along a walking trail, leave drops of your scent every few yards to mark out your territory. Have your partner try to locate and follow your scent trail.

Real Estate

Establishing and maintaining a nesting site within a territory is crucial to the survival of many mammals. Select a mammal and try to make it a home, or construct a home for an imaginary mammal, a miniature mammal, or one your size. Try building a nest, den, or burrow using only natural materials (no picking or breaking branches, please) and just your own hands (no shovels or rakes). Think about the features of your animal's home. Consider its size, number of entrances, how well it will protect the residents from predators, its proximity to food and water, and features that provide warmth.

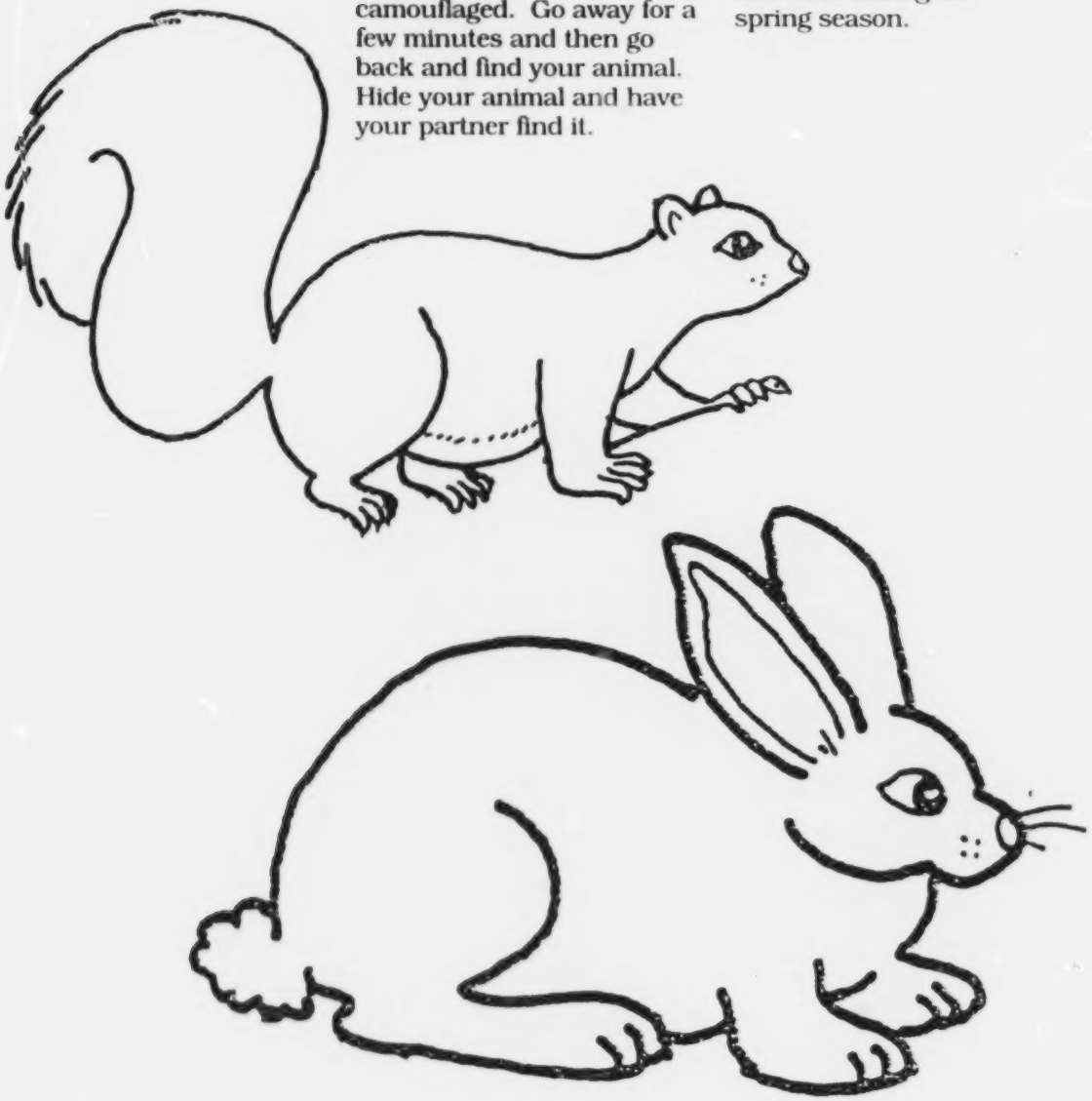
Camouflage

Mammals have many types of defense mechanisms, including scents, mobility, behaviors, and colorations. Many mammals protect themselves by camouflage (blending in with their surroundings). On a piece of white paper or an index card, cut out one or more of the mammal shapes shown here and on the next page.

Color the animal so that it blends in with the natural colors where you will be placing it. Hide the colored animal so that it is well camouflaged. Go away for a few minutes and then go back and find your animal. Hide your animal and have your partner find it.

Mammal Signs Scavenger Hunt

Go out on a walk in search of these signs of mammal activities during the spring season.



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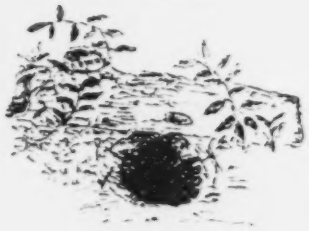
S C A V E N G E R H U N T

mammal signs

☐ an underground home 	☐ droppings (scat)	☐ something a mammal could smell
☐ a mammal track	☐ a mammal	☐ signs of a meal
☐ something a mammal could eat	☐ something a mammal could use to build a shelter	☐ draw in your nature notebook a mammal that might live in the habitat you are in

FLOWERS AND INSECTS

When spring flowers bloom, people rejoice. To many people, flowers are the first real sign of spring. In addition to pleasing us visually, these springtime beauties have the important task of attracting insects and other small animals whose pollinating role is critical to the plant's cycle of reproduction. The following activities demonstrate the incredible relationship between flowers and their pollinators that we can observe this season.

A fun exercise. We talked a lot about the design of different flowers. It inspired us to do nature sketching.

PHOEBE BARNES

Observation Walk

Go on a flower observation walk. See what flowers you can find growing on the ground, on shrubs, and on trees. Compare colors, sizes, and scents. Try to figure out which flowers were planted by people and which occur naturally. When flowers grow in rows, they were most likely planted by someone.

Look closely at some different flowers. Flowers are often specifically designed to attract bees, butterflies, hummingbirds, bats, and other pollinators. The colors and scents of flowers are really tactics to attract pollen-spreaders to come feed. Some flowers have markings that resemble airplane landing strips. Some of these are visible only in ultraviolet light. Do you see any flowers which have these markings visible to you?

Pretend you are an insect looking for a sip of sweet nectar. Which flower would you be attracted to? Gently put your fingertip on the inside of a flower. Look to see if any pollen stuck to your finger.

Compare the parts of your flower with this illustration. A hand lens may be helpful. Can you find all the parts on your flower?

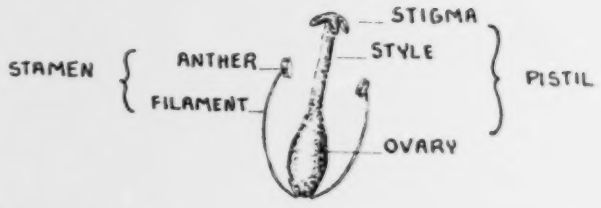
Hidden Colors

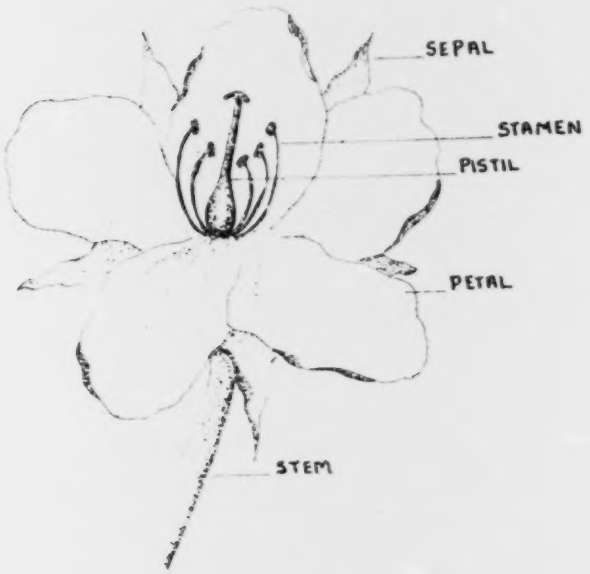
Collect a small assortment of flower petals (8-10) and a few fresh, green leaves. On a white index card or light-colored cardboard, create a colorful picture by smudging the petals and leaves on the card. Press and smudge each one until its colorful "juices" are transferred onto the card. You may be surprised to discover some petals and leaves create smudged colors which are quite different from what you expect. Also, some of the smudged colors may change as they dry. Common plants to try include

dandelion, clover, buttercup, and crabgrass.

Busy Bees

There are three types of bees in honey bee hives: queen, drone, and worker. One queen lays all the eggs. A few drones mate with the queen. Hundreds of sterile female worker bees collect the nectar and pollen, process it into honey, and store it. The worker bees care for the queen and they also feed and care for the queen's eggs. Pretend you are worker bees. Separate from each other and go in search of some delicious nectar and pollen (i.e., some flowers). When you find a good source, pretend to collect some nectar and return to your partner. Now tell your partner, who is also pretending to be a worker bee, how to find your nectar source—by doing a dance! You can point, flap your wings, and lead the way. Switch roles. Have your partner go and search for flowers, and then return to tell you the location by making up a bee dance.





I hadn't thought before how many flowers have "bull's eyes" at their center to draw in the insects.

SHARON BAUER

Flowers and Pollinators Scavenger Hunt

Try to find some of these things related to flowers, bees, and other pollinators. A good location for this scavenger hunt would be any garden area with flowers in bloom.

FLOWER CRAFTS

The following flower crafts are simple to do. They make great gifts. Some collecting is necessary, so try to follow these guidelines.

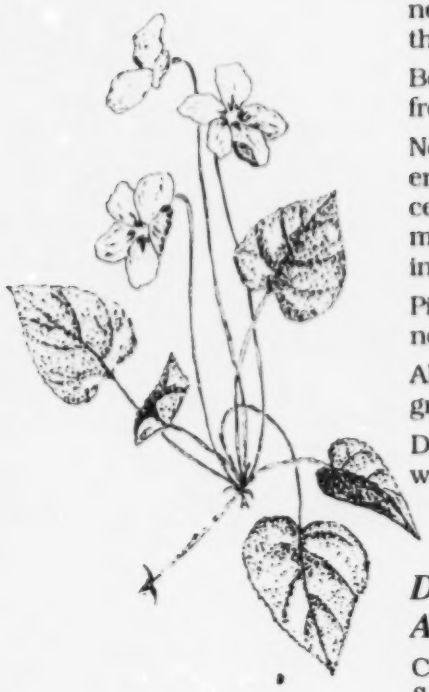
Be sure to have permission from the landowner.

Never pick anything rare or endangered. A local nature center or conservation commission can provide this information.

Pick only as much as you will need.

Always leave plenty of plants growing undisturbed.

Do not pick anything at a wildlife sanctuary.



Dried Flower Arrangements

Collect an assortment of flowers, herbs, and grasses. Tie your plants into small bunches and hang in a dry place for several weeks. When they are totally dry, separate the bunches. Arrange the dried plants in baskets, into wreaths, or tied in bouquets with a pretty ribbon.

Pressed Petal Collages

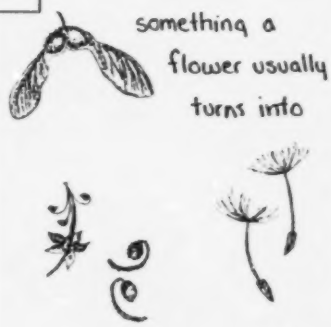
Collect some petals, and place them flat in a dry place. When they are totally dry, arrange them into designs, words, pictures, or patterns on colored paper or cardboard. Cover the designs with clear laminating plastic, which you can purchase where sticky shelf paper is sold. You can create pictures, cards, and bookmarks. Using the clear laminating plastic on both the top and bottom, you can make a hanging window decoration.

Sachets

Collect fragrant leaves, herbs, and flower cuttings. Good collecting sites are flower and herb gardens (with permission, of course). Hang your plant cuttings in small bunches or in baskets in a dry place for several weeks. When dry, crumble and blend the ingredients into combinations you enjoy smelling. Place your blends into baskets, tins, boxes, jars, or colorful calico pouches.

SCAVENGER HUNT

flowers and pollinators

- ☐ a bee
- ☐ pollen or nectar on a flower
- ☐ a loose petal to press in your nature notebook
- ☐ a pollinator
- ☐ a cool place where an insect could rest
- ☐ a flower with a smell
- ☐ a flower with more than one color
- ☐ something a flower usually turns into 
- ☐ an insect relative

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long days, warm nights

J U L Y – A U G U S T

Summer is a great time to go on outings. Days are long, allowing anyone who works all day to still get out after dinner for an hour or more. With all the fresh green foliage, warm temperatures, and open water, wild animals are active and observations are easier now than at any other time of year.

ACTIVITIES

Here are two summer outings to try. The first is a visit to a pond, particularly one inhabited by frogs, turtles, various aquatic insects, and other small fresh water animals. The second outing is a walk at dusk or in the night. Remember to bring drinking water. Warm-weather outings may make you thirsty.

A VISIT TO A POND

Visiting a pond on a sunny summer day or early on a warm night is sure to be rewarding. Most people, young and old, are attracted to bodies of water. Just what it is about water that is so magnetic may remain a mystery, but it is definitely appealing to most of us.

Finding a pond to visit should not be too difficult. A local wildlife sanctuary may have several ponds within its boundaries. Local conservation organizations may be able to make suggestions. State and local parks often have bodies of water. With permission, a pond on private property may be available.

Pond Observations

When you arrive at the pond, move as slowly and quietly as possible. First, make some initial observations and write them in your nature notebook. You can usually see and hear the most early in your visit. As you move around, some animals may become

startled and retreat to deeper water. Look for frogs and turtles on logs, rocks, or along the bank. Watch the water for ripples, bubbles, and other movements from animals beneath the surface. Look for insects skimming the pond surface. Listen for the sounds of frogs, birds, insects, moving water, or splashing.

Pond Scavenger Hunt

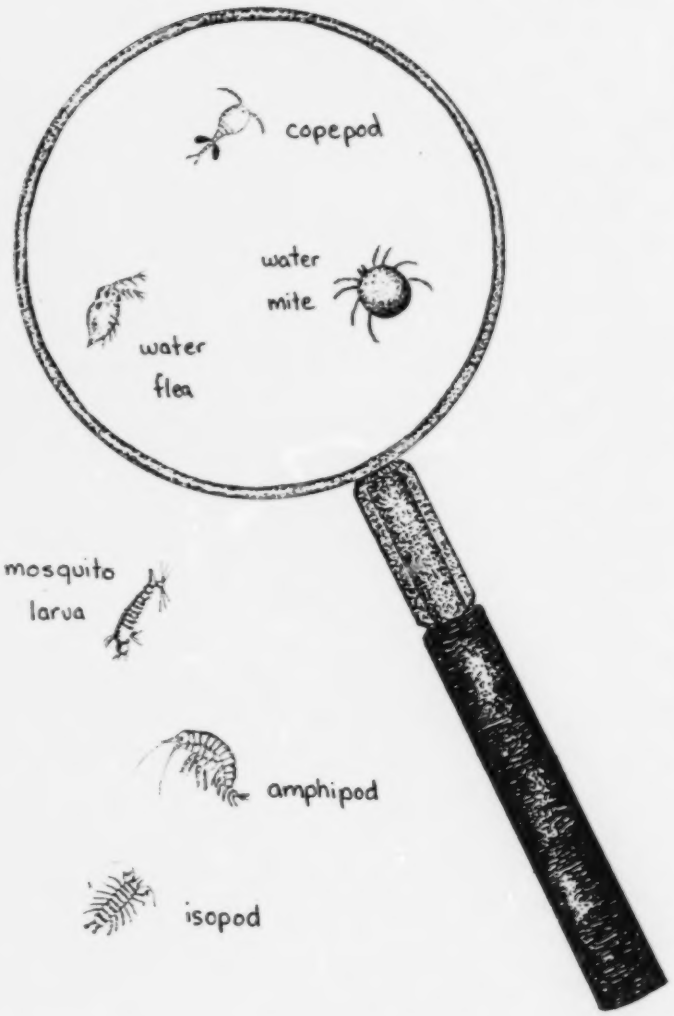
Go on a scavenger hunt near a pond and try to see some of the items shown on the next page.

Pond Collecting

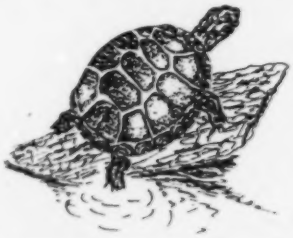
With just a few, simple pieces of equipment, you can get a very close look at many small pond animals. You may want to bring any or all of these things:

small white plastic cups or empty food containers
a strainer, net, or kitchen colander
white plastic spoons
a pond field guide
bug boxes or hand lenses

Using the strainer, net, or colander, collect some mud from the pond's edge. Look closely in your strainer. Carefully remove any small animals and put them into the plastic cups with some pond water. Return all the



pond SCAVENGER HUNT

☐ a pond sound	☐ a pond insect	☐ a camouflaged animal
☐ a plant that lives where the soil is wet	☐ a place where a turtle could sit in the sun 	☐ a bird near the water
☐ something that floats	☐ something that sinks	☐ tracks along the edge of a pond

mud from your strainer to the pond so that if it contains any animals too small to see, they will be returned to their habitat. Collect animals from different places around the pond. Use the cups and spoons to hold and observe the animals you have collected. The bug boxes and hand lenses can be useful in making your close observations, since most of these animals are very small insects and crustaceans. Common types of pond creatures you are likely to find are shown here. For more information, refer to a field guide to fresh water organisms. Always return all things collected to their habitat.

Camouflage Frogs and Turtles

When you arrive at a pond and look for frogs and turtles, you might see some right away, you might have to search for a while first, or you might not see any. How likely you are to see these animals varies. Factors affecting the chances of seeing frogs and turtles include the warmth and sunlight available, the population living in the pond, the visibility, and any activity occurring just before your visit. Frogs and turtles generally surface to warm themselves in the sun, so there is a much better chance of seeing them on warm, sunny days. It can be easier to locate turtles and frogs on logs and rocks that are clearly visible and not obstructed by vegetation. Remember, they prefer to remain concealed, so look carefully. Consider the many activities around the pond. Has a dog just splashed through the water? Have some noisy walkers just gone by? Did a carefree person throw a stone into the pond? Has an osprey just caused a big splash while trying to catch a fish? Such disturbances will temporarily send most resident turtles and frogs under cover. If you wait for a while, they may climb back onto their sunbathing logs right before your eyes. You are more likely to see them sunning on sunny, but cool mornings. By mid-afternoon, the sun can be too hot for them.

damselfly

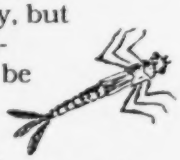
dragonfly

dragonfly nymph

water strider

whirligig beetle

water boatman

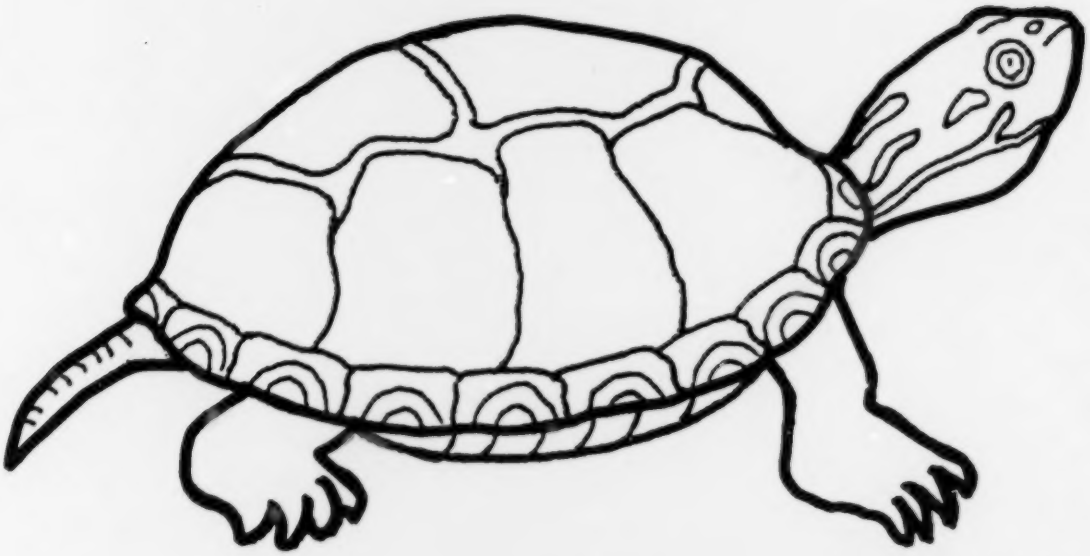

damselfly nymph

backswimmer

snail

Whether or not you see turtles and frogs on your pond visit, you can learn about them by playing this camouflage activity. Using index cards or light-colored cardboard, cut out some frog and turtle shapes. You can make your own shapes or

copy the ones here. With crayons or markers, color the cutouts so that they resemble the real animals. One of you can place the cutouts around the pond, on rocks and logs, along the



bank, and in the vegetation. Once the "population" has been set out, the other partner can go in search of these pond residents, counting how many can be found. You can continue taking turns hiding and searching for these animals. This allows you to see where real frogs and turtles live and how their coloration keeps them camouflaged. Please remember to collect all the cutouts so none are left at the pond.

Frog and Toad Chorus

When you visit a pond, you may hear frogs vocalizing. Frogs and toads of the same species are able to locate each other by using their voices. Their calls help them attract mates and establish territories just like birds. With three or more people, you can create a frog and toad chorus similar to what might be heard at a pond on a spring or summer night. With more people, you can divide into

American toad:
"Fried Rice,"
in a high-pitched, humming voice
Spring peeper:
"Mashed Potatoes,"
in a high, squeaky voice

pairs, select calls, separate, and try to locate your "mate" by closing your eyes and moving toward their call. Either version offers a fun way to communicate like frogs and toads. Here are the parts to the chorus. The calls given are the closest words that resemble the actual calls made by these frogs and toads.

Bullfrog:
"Jug-A-Rum,"
in a low, deep voice

Leapfrog

As you walk along the edge of a pond, you may hear the familiar "kerplunk" of a startled bull or green frog jumping into the water. Some frogs have very muscular hind legs that enable them to leap far distances. Try to move like a frog by playing a game of leapfrog. See if your legs are strong enough to send you far distances by jumping this way. Human legs are ca-

pable of walking, but not hopping long distances as opposed to frog legs.

Make an Origami Hopping Frog

Using this paper folding technique, you can create a frog that actually hops. Copy the model shown here onto an index card or lightweight cardboard and follow the folding directions.

Directions:

1. Fold line AE behind and then open back up. Repeat with BF.

2. Fold line GH to front and then open back up.

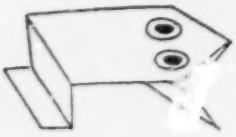
3. Gently press G and H in. I will pop up like the point of a pyramid.

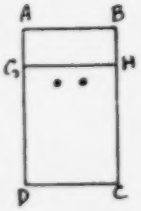
4. Working on the back, fold J to I and then K to I.

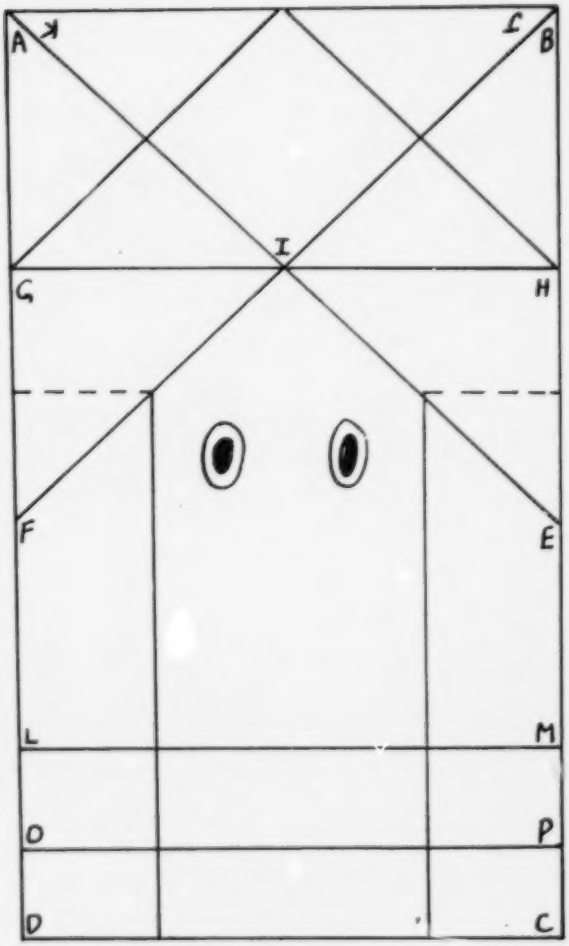
5. Fold FD to center of back side. Repeat with EC.

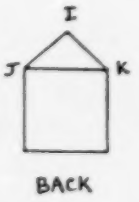
6. Fold ML toward back and then fold PD down.

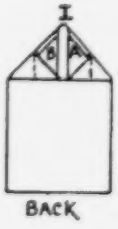
7. Push down on the back end to make the frog jump.

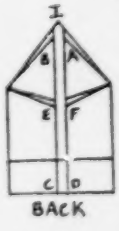












Make a Flycatching Frog

Frogs use their long, sticky tongues to catch flying insects to eat. Here is one way to make your own flycatching frog.

Supplies:
a party blower
clear tape
crayons or markers
cardboard or oaktag

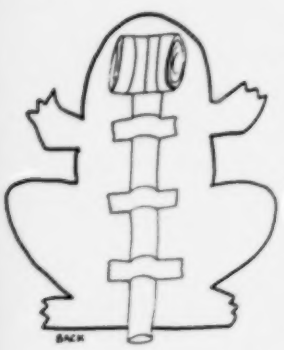
Directions:

1. Cut out the frog body on cardboard or oaktag.

2. Color.

3. Tape the party blower as shown.

4. Blow on the party blower and watch your frog try to catch some flies!



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A SUMMER NIGHT WALK

One evening, while I was on the back porch staring at the stars, I heard a clicking noise. When I looked around I saw a skunk crossing my street. The noise was made as its claws hit the pavement. I froze. The skunk waddled right by me and went under the porch. Until then, I never knew skunks lived in the suburbs, particularly mine, and specifically under my own house.

There is no other season in a temperate climate during which an evening outing is as simple and yet rewarding. It is warm enough that you can leave your coats behind. With the daylight extending into the evening, you can leave your flashlights behind, (except that one activity described here does require a flashlight). You may want to apply insect repellant before your walk, and bringing water to drink is always a good idea, especially in warm weather.

Fields, forests, and ponds are all magical places to visit on a summer night. In a field you can look for fireflies, listen for insects and songbirds, and watch the sky darken. You can listen for owls calling and other animals moving about in the forest. A night walk around a pond may offer you frog calls, bird songs, and perhaps the site of a thirsty deer getting a drink. Muskrats, beavers, or raccoons may also appear.

A visit to any natural area at dusk is a wonderful experience. Playing the natural symphony game explained in the observation skills section will give you an idea just how many different animals are active when you are visiting. Here are some activities that can help you enjoy the natural world at dusk. Keep in mind, however, that simply walking or sitting in an open, natural setting as day turns into night is a special experience by itself. The animal sounds, sky changes, and muted light offer enough.

Silent Sit

Dusk is a time of increased animal activity in any natural area. In a field, near a pond, or at the base of a tree, find a comfortable spot on which to sit or lie with your partner. Remain silent for a minute and listen and watch around you. When the minute is up, share what you heard and saw.

Firefly Signals

The sight of fireflies in a field is a highlight of any summer evening. The lights you see are signals sent by the female fireflies to attract males of the same species. In some species a female will imitate the signal of another species to attract a male and then eat him. You can pretend to be a firefly with the use of a flashlight and by

going outside on a dark night. You and your partner should decide on a signal (a series of light flashes to be made with the flashlight) and then stand at separate ends of your play area. The female (the partner with the flashlight) can attempt to attract the male (the other partner) by sending the light signals. The male should move toward the signals until he reaches the female. The female can also try an "ambush" by sending a fake signal. If the male comes to the female on the wrong signal, he has fallen into a trap and just became her dinner!

Colors At Night

Two types of eye cells aid vision. **Cone** cells allow the eye to see color in the presence of light. **Rod** cells allow the eye to see shades of light and dark in the absence of abundant light. Human eyes are designed to see best in the presence of light, and our cone cells are better developed. Nocturnal animals have more rod cells, enabling them to see better with less light. At night, with less light, we use only our weaker rod cells, and are essentially colorblind.

To experience your nighttime colorblindness, pack 10 pieces of construction paper all cut the same size, but of assorted colors, and go out at dusk. Show your partner one of the colored papers. If it is not yet dark outside, the color will be easy to detect. As you stay out and the daylight dwindles, try this again. At some point, there will not be enough light to see the colors of the papers.

Homemade Fireworks

A fun activity to try on a very dark night (or in a dark closet at home) is to make your own "fireworks." All you need is a roll of wintergreen Lifesaver candy. You and your partner should face each other and breathe for a minute with your mouths open so that the inside feels dry. When you are both ready, simultaneously pop a Lifesaver in your mouths and chomp. Keep your mouths wide open so you can see each other's fireworks. This works best with a fresh roll of Lifesavers.

summer's grand finale

S E P T E M B E R

The days are getting shorter and the nights cooler. Song birds begin to flock for migration to wintering grounds. The broad leaves of deciduous trees begin to change color. Autumn is coming, but it is not here just yet. There is a brief season between summer and fall, a time to enjoy the best of both seasons. Many plants are still flowering and are visited by honeybees. Monarch butterflies are feeding on milkweed in open fields along their migration routes. Milkweed and other meadow plants begin to employ their ingenious strategies for dispersing their seeds before the first killing frost arrives. Many animals, such as insects and spiders, are now mating and laying eggs, the only way their species can overwinter in a climate with winter temperatures that go below freezing.

ACTIVITIES

MEADOW SEEDS

On an exploratory walk in a meadow on a late summer day you can witness these early preparations for the coming cold season. The yearly cycles are apparent in this season as plant growth slows, and plants and animals that do not remain active in freezing weather begin to migrate or prepare to overwinter. Here are some activities designed to help you appreciate the "work" required in late summer by the rooted residents of a field.

Hitchhikers and High Flyers

Go to an open, uncultivated field that has not recently been mowed, or walk along

ıe unmowed edge of a farm eld, road or yard. The rasses and other plants are mploying highly specific, ell-evolved strategies for ispersing their seeds before he first big frost. You can asily observe three seed ispersal strategies: wind arried (milkweed, dande- ion), animal ingested (fruits, uts, and berries that are aten and the seeds elimi- ated with the animal's xcrement), and hitchhikers eeds with hooks and barbs hat attach to the fur or eathers of a passing animal nd eventually fall off else- here). These strategies llow the seeds to be dis- ersed far enough away rom the parent plant so here will not be direct ompetition for root space nd sunlight later on be- ween the plant and its own ffspring.

Take Wing

Try to find some milkweed or dandelion "fluff." If you look closely, you might find that each bit of fluff has a tiny seed delicately attached at one end. The fluff acts as a sail, enabling the seed to travel with the wind, often for great distances. Collect a handful of seeds with attached wings and blow them away. Observe the distance they travel. Discuss what could affect this distance, such as wind, rain, the dryness of the fluff, etc. Have a "race" between two or more flying seeds to see which travels the farthest before landing on the ground.

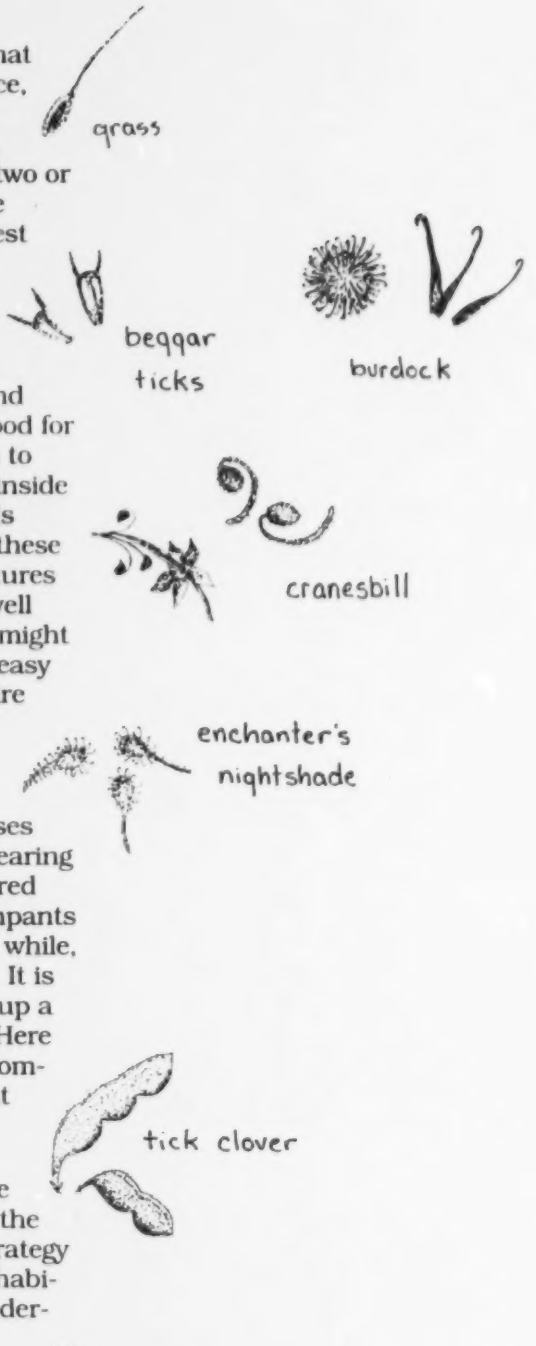
Seed Search

Look for fruits, nuts, and berries that might be food for an animal. Open them to find which have seeds inside and which are the seeds themselves. Compare these wild foods for such features as which would store well over the winter, which might taste sweet, which are easy to eat, and which require some effort to open.

Give a Ride

Walk through the grasses and other tall plants wearing long pants. (Light colored sweatpants and stretchpants work the best.) After a while, look at your pant legs. It is likely you have picked up a few hitchhiker seeds. Here are some of the more common types of seeds that travel this way.

Please try to release the seeds before you leave the field. After all, their strategy is to land in the same habitat, but not directly under-



neath their parent plant. If you are curious, you could take home a small variety of these seeds, try to grow them in soil with periodic waterings, and see what happens.

MEADOW INSECTS

Grasses are just some of the meadow residents preparing for the cold season. We can see insects and spiders preparing for the end of summer as well.

Sweep Netting

If you have a sweep net to use, you can collect, observe, and release many different meadow insects. Go to a meadow or along a road where the grass is at least a foot high. Sweep the net through the grass quickly. After a few sweeps, look in your net to see if you have caught anything. The illustrations here may help you identify any insects and their relatives in your net. For more information, use a field guide to insects.

female

field crickets

male

Crickets

A field or roadside habitat is often full of crickets in late summer. These insects are busy mating and laying eggs this season. After mating and laying eggs, all the adults will die. The young will emerge in the spring as the new generation of crickets. The chirps you hear are mating sounds made by the males trying to attract females of the same species. They are made when the sharp edge at one end of a front wing rubs along a file-like ridge under the other front wing. There are over 900 species of crickets in the world, and each has its own distinctive chirps and rhythms.

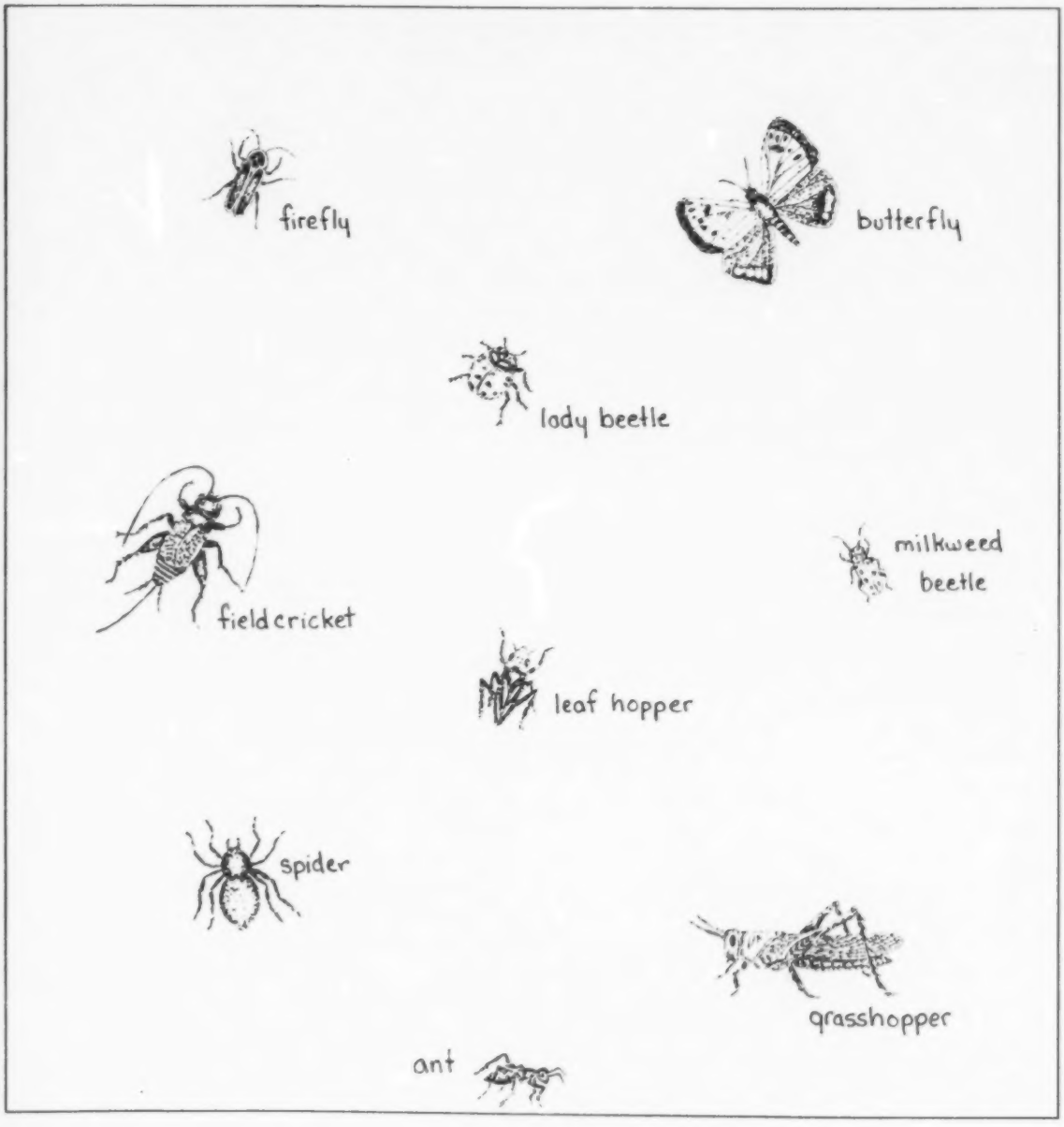
Crickets: Telling the Temperature

If you hear snowy tree crickets, which are common in homes, you may be able to estimate the air temperature. Listen for the chirp of one cricket and count how many times you hear it in 15 seconds. Add 38 to the number of chirps you counted. The total should equal the approximate air temperature in degrees Fahrenheit.

Crickets: Male or Female?

Try to catch a cricket, being careful not to injure it. A close look at a cricket will allow you to tell a female from a male. Compare the cricket you are holding to these illustrated and try to determine if it is a female or male.

MEADOW INSECTS AND RELATIVES



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forests in autumn

O C T O B E R

Autumn offers us blue skies and crisp breezes. Vibrant leaves color the landscape with an everchanging, dynamic display. Warm, sunny days are sharply contrasted with cold, dark nights. It is a comfortable season during which to go out. Pleasant, dry weather, few biting insects, and beautiful scenery are just some of the abundant reasons.

ACTIVITIES

A deciduous forest is a great place to explore in the fall. Changes in trees and the forest floor are easily observed during this season. The most obvious change is leaves changing color and falling off. This dramatic color display occurs as green pigment breaks down and no longer masks the yellow and orange pigments that have been there all along. This is triggered by shorter days and cooler nights. The fallen leaves play a vital role in recycling forest nutrients. The following activities can help you understand these easily observed changes and their roles.

AUTUMN FOREST TREK

Autumn Observation Walk

Go out and see all that is around you. Look at colors, shapes, and textures. Find pretty leaves on the ground. See which trees are losing their leaves and which are not. Share your observations together. Record them in your nature notebook, if you like.

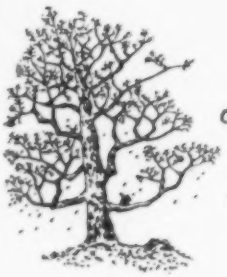
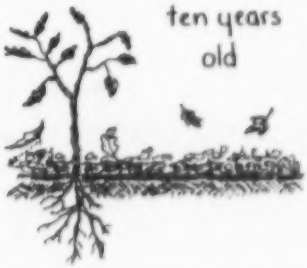
Autumn Scavenger Hunt

Go out and see how many of these things you can find.

Your Special Tree

Go find your special tree from the late winter, or find a new one. Select a tree with broad leaves, not needles. Visit your tree repeatedly throughout the

S C A V E N G E R H U N T *autumn*

☐ a leaf with three colors on it	☐ an insect home	☐ a leaf with teeth
☐ a leaf with lobes	☐  an autumn sound	☐ something that reminds you of fall
☐ a tree that doesn't lose its leaves all at once	☐ a plant in fruit	☐ a leaf that is over ten years old 

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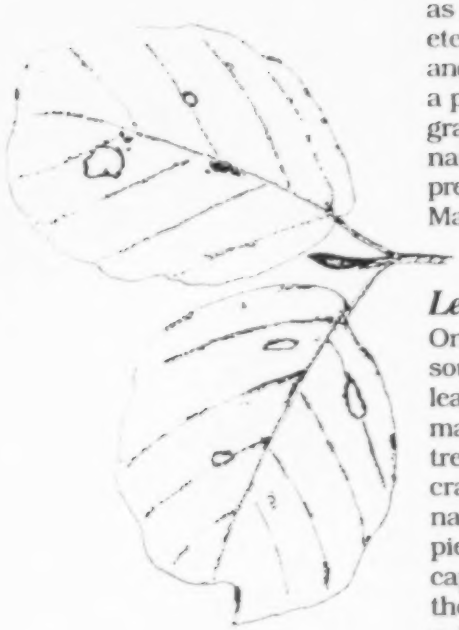
autumn and observe its changes. See if the leaves all turn the same color and shade. Notice what type of seed the tree has (such as berries or nuts) and whether or not you can see buds on the twigs. Look for things that make your tree different from those around it, such as its height, trunk diameter, bark color and texture, and leaf shape and size. Draw a picture or place a photograph of your tree in your nature notebook. Glue a pressed sample leaf on a page. Make a leaf or bark rubbing.



Leaf and Bark Rubbings

One way to take home a souvenir from a forest while leaving everything there is to make a rubbing of a leaf or tree bark. With a dark crayon and a page in your nature notebook, or a blank piece of paper, you can capture the exact image of these items. To make a leaf rubbing, simply place the leaf (veins facing up) on a flat, hard surface and cover it with one layer of paper. Rub the side of the crayon lightly on the paper, evenly coloring the page until the whole leaf shape shows. To make a bark rubbing, hold the paper up against a tree trunk while you rub a crayon on the paper.

Leaf Motels and Restaurants

Pick up a fallen leaf and look at it closely. See if you can find any small holes or bumps. The holes are where small animals such as caterpillars, ants, or beetles have been eating. The bumps are where small animals are spending part of their lives. Look for a tiny hole in the bump. Such a hole may have been an exit door for the animal or where another animal (parasite or predator) entered. If the bump has no hole, the animal may still be inside, where it will safely spend the winter. Fallen leaves are like restaurants and motels for little animals, so it is important to leave them in the forest. If you want to occasionally take a leaf or two home from an outing, make sure it is not currently housing any small inhabitants.

Forest Floor Archaeologists

The forest has many visible layers—treetops, trunks, shrubs, ground plants, and the forest floor. During this season, a new layer of leaves falls onto the forest floor. Take a close look at the forest floor and what lies beneath it. Find a place in the forest where the ground

is covered with various types of leaves. Place a circle of yarn or string approximately two feet in diameter on the ground. This will mark the boundaries of your study plot.

In your study plot, pick up all the leaves that look like they fell this season. These will be the leaves that are practically whole and easy to recognize. Put these in a pile. These leaves make up a layer called the **leaf litter**.

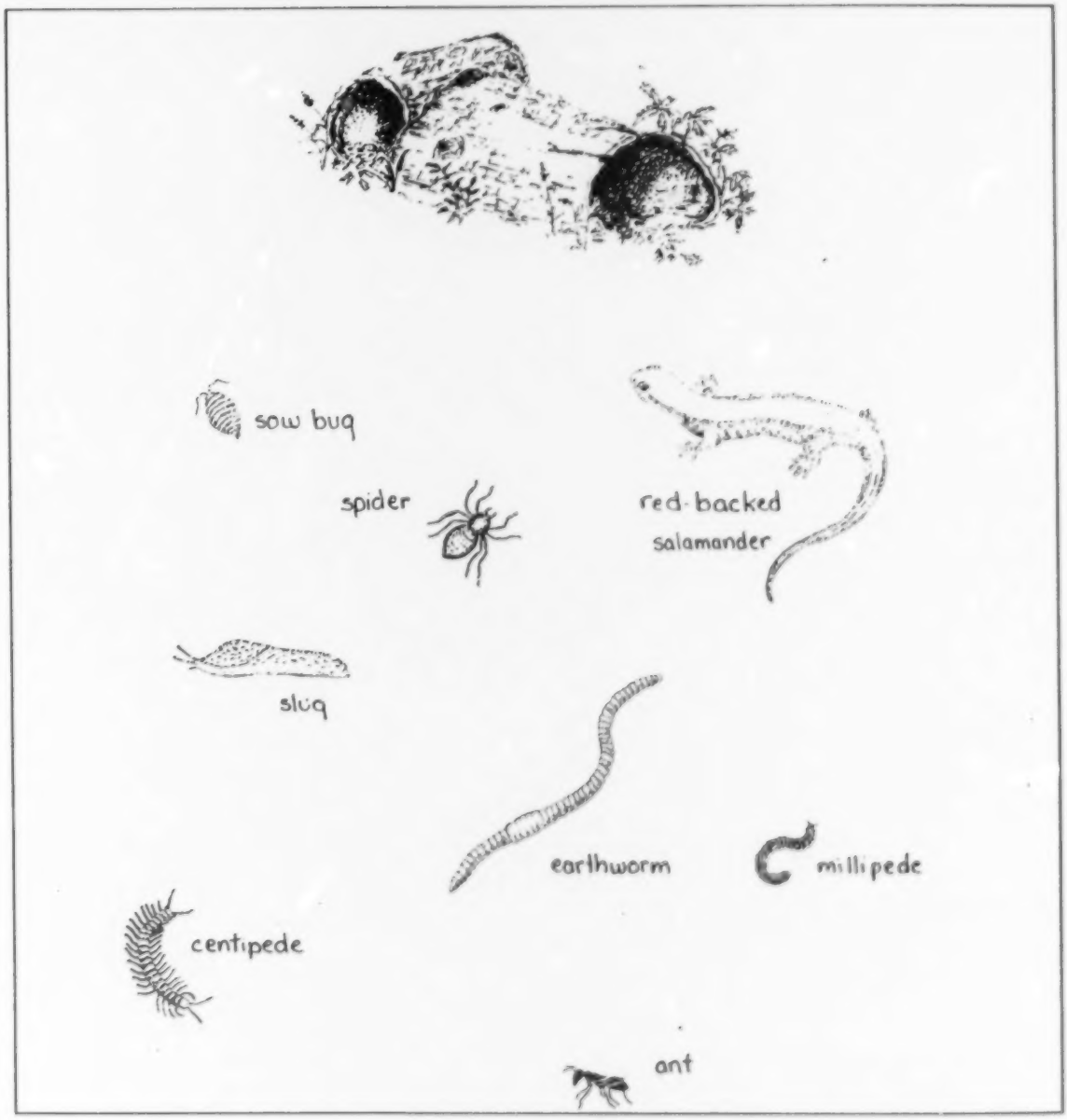
Pick at and remove the next layer that should be recognizable remains of leaves, twigs, and other pieces of forest "litter" that have begun to decompose. These have probably been here since last autumn. This layer, approximately one year old, is called the **duff**.

Investigate and remove the next layer which will consist of small, broken, barely recognizable remains of forest litter. This rich and nourishing material is beginning to resemble soil and holds moisture well. This layer is referred to as **humus** and has most likely been here for two to three years.

If you continue digging, you will now reach the soil layer. Nourished by decomposing layers above, the soil holds water and nutrients for plant roots. It took three to seven years for this layer to form. If you dig down below the soil, you may eventually reach two more layers—subsoil and bedrock.

Now that you have taken a close look at the layers beneath the forest floor, try to put the study plot back as you found it, returning the layers in order. Remove your circle marker and help make it appear that the area has not been disturbed. Think about the years required for soil development in the layers you have investigated. Imagine the number of years "wiped out" by the work of a bulldozer clearing a wooded area.

LIFE UNDER A LOG



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Life Under a Log

Fallen logs that lie on a forest floor make great homes for many animals and plants. They offer small animals food, shelter, and moisture, and provide growing places for fungi and some plants. Earthworms, spiders, slugs, snails, salamanders, and insects can be found in these dark, cool, wet habitats. Carefully lift a log and look at the ground surface uncovered and on the underside of the log. Identify any animals you find by comparing them to those shown here. Be sure to return any animals after you carefully replace the log to the position in which you found it.

Mini-Parks

The forest floor is full of interesting features. One way to take a close look is to create a mini-park. Go to a forested area or under any group of trees. Lay a piece of yarn or string, at least 15 feet in length, on the ground so that it touches various things such as leaves, roots, moss, and anything else it can reach. By crawling along on your hands and knees and pretending you are a very tiny person (or ant, troll, gnome, or any tiny creature), explore the "trail" created by the yarn or string. A patch of moss becomes a golf course, a few drops of water in a leaf is a lake, and a small group of plants may be a tropical jungle. You will find many imaginative features as you explore your tiny park and investigate the forest floor at the same time.

preparing for winter

NOVEMBER - EARLY DECEMBER

In late autumn, when nightime temperatures begin to approach freezing, wildlife survival strategies are evident. We see fewer animals, and those we do see are either inactive or are very busy collecting and storing seeds and nuts for winter. There is a quieter mood while animals begin to employ the three strategies for surviving winter in a temperate climate—dormancy, migration, and staying active.

ACTIVITIES

WINTER PREPARATIONS

Animals that are not equipped to maintain their active body temperatures become **dormant**, allowing their body temperatures to drop and either resist freezing or tolerate its effects. True hibernators—two species of jumping mice, four species of bats, and woodchucks—drop their metabolism and body temperature to a comatose state and remain totally dormant for the winter. Deep sleepers, including bears and chipmunks, sleep for long periods, but will wake in warm weather. Reptiles, amphibians, adult insects, and other animals that use external sources for heat wait out winter inactively in a cool but safe temperature range in leaf litter, below the frost line, or in water.

Migration is a winter survival strategy that involves moving. Some birds migrate hundreds of miles to wintering grounds with available food and water. Other animals migrate only a few hundred yards to a protected area.

Staying active is the other winter survival strategy. Birds fluff up their feathers

for warmth. Mammals grow thicker winter coats and accumulate fat. Some (deer and rabbits) collect food daily, while others (squirrels and mice) eat stored seeds and nuts.

When you go out in cold weather, try extra hard not to disturb any wild animals you encounter. Whatever strategies they employ, surviving winter is a critical challenge, and wild animals have little energy to waste during this season. You can make yourself comfortable by dressing warmly and eating high-calorie snacks to keep warm. The sun sets quite early this time of year, so be prepared for colder temperatures as the sun goes down.

Late Autumn Wildlife Scavenger Hunt

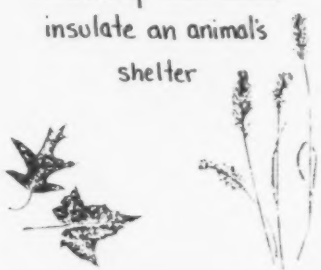
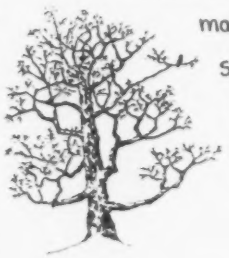
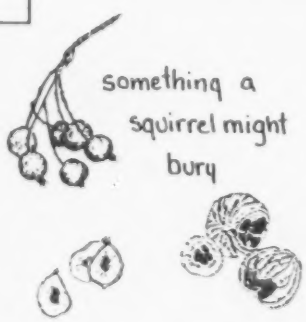
See how many of the things on the following page you can find on a walk.

Building a Warm Home

Pretend you are a small wild mammal and it is time to build yourself a warm home in which to spend the winter. Using just loose objects such as sticks, mud, leaves, and small stones, construct a home for your animal. Try to make the home warm by using insulating materials such as dried grasses, mud, and leaves, and by designing it to be protected from rain, snow, and wind. Try to make the home safe by having any entrances and exits be well hidden and small enough to prevent animals larger than the occupant from entering. Try to make the home comfortable by lining it with soft materials. Once your home is complete, you can go looking for food for your animal.

You can test how well insulated your animal home is by conducting this experiment. Bring a thermos of hot liquid gelatin and two small cups to your animal home. Place one cup of liquid gelatin inside the home and place another cup outside the home. If your home is well-insulated, the heat released from the cooling gelatin will stay inside it. The warm house will keep the gelatin inside from cooling off as quickly as the gelatin outside. Both cups of gelatin will solidify as they cool. If the cup of gelatin outside solidifies faster than the one inside, it proves your home is insulated enough to retain some of the gelatin's heat.

late autumn wildlife SCAVENGER HUNT

☐ a burrow where a groundhog could sleep	☐ something that could insulate an animal's shelter 	☐ a place where an animal could sit in the sun
☐ an animal with a fluffy coat	☐ birds flying south	☐ something that makes a shadow longer than yours 
☐ an animal's shelter	☐ something a squirrel might bury 	☐ an animal sign

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Breathing Like a Woodchuck

Count the number of breaths you take in one minute when you breathe at your normal rate. It should be between 12 and 24. Next, breathe as slowly as you can and again count the number of breaths you take in a minute. When a woodchuck is active, it breathes 100 to 200 times in a minute, but when it hibernates it breathes just once approximately every five minutes. An active bat breathes 200 times a minute, while a hibernating bat breathes less than 25 times a minute. Try to imagine slowing down so much for the whole winter.

Comparing Your Circulation

Count your pulse for 15 seconds and multiply the number by four to determine the number of times your heart beats in one minute. The final number is likely to be between 80 and 100. Take your pulse at different times during the day—when you first wake up, after you exercise, and after a meal—and see how much it varies. Compare the results with these circulation facts.

An active woodchuck has over one hundred heartbeats a minute, while a hibernating woodchuck has only four.

During four months of hibernation, a woodchuck uses as much energy as it would in four active days.

Even animals that stay active in winter slow down. A squirrel's heart rate is 350 beats a minute in summer, 5 beats a minute when resting in winter.

A shrew, which breathes as many as 750 times a minute, has a resting heart rate of 164 beats a minute and an active heart rate of 600 beats a minute.

Eating Enough to Keep Warm in Cold Weather

If you were a shrew, you would weigh about the same as two quarters and you would have to eat the equivalent of your body weight every day to stay warm. Calculate your daily food needs as a shrew. The number of pounds of food needed daily would equal your current body weight. For a more tangible comparison, multiply your body weight by four. This number equals the total of quarter-pound hamburgers you would need to eat if you ate like a shrew trying to stay active on a winter day.

snow MID-DECEMBER–JANUARY

Winter is the season of snow in a temperate climate. Snow is a magical form of water. It gives us picturesque landscapes, a special feeling, and wonderful fun. It also serves to insulate plants and animals.

ACTIVITIES

SNOW

Snow begins as a speck of dust or salt that attracts molecules of water from clouds. As the water molecules accumulate, they form ice crystals, which become larger and fall to the ground. Snow usually forms when air temperatures are from -40 to 32 degrees Fahrenheit.

People usually associate snow with the cold, since it falls during the winter, but snow is actually like a warm blanket for wildlife. Snow is mostly air. Fresh powdery snow is about 93 percent air, and the air spaces between the snow crystals trap warmth radiating from the ground and prevent air movement. This creates an insulating layer over the land, protecting small animals and plants from the drying and chilling winds, yet allowing the sun's energy to get through. The ground layer under this protective snowy blanket can remain just above freezing, and this creates a warm, safe place compared to the snow's surface.

Animals have adapted to snow in many ways. Deep snow helps cottontail rabbits to reach buds to eat. Ruffed grouse grow hook-like combs on the sides of their toes to help them travel on snow, and they dive into powdery drifts to keep warm at night. Snowshoe hares have large feet that support them on snow, and their coats turn lighter in winter, helping them hide by camouflage. Bird and mammal activity can be seen as tracks around habitats and near water.

Plants have also adapted to snow. To plants, winter is a

time of drought, when little water is available to them. Many plants remain dormant during the winter, some lying under the insulating blanket of snow. Birches have fine branches and flexible trunks which can bend under heavy snow and spring back when it melts. Evergreen branches are designed to shed snow, relieving the strain of the weight of the snow.

Many plants and animals that have adapted to snow are affected by changes in average snow conditions. For example, during a mild, snowless winter, animals that would live under the blanket of snow have nowhere to find protection from the cold or from predators.

Getting about in a snowstorm may be difficult, but there are some real benefits to snow. Our water supply depends on it. Plants and animals need it. Naturalists are offered a "chalkboard" for animal activity with opportunities to observe and study wildlife tracks that are more obvious on a snow-covered landscape than during any other time of year. By wearing dry, warm boots and appropriate clothing, you can enjoy a winter outing, complete with lots of snow.

Trackmakers

Make your own tracks in the snow. Go to an open area covered with snow. While one of you closes your eyes, the other can create a track story. Try different movements such as running, walking, hopping, and jumping. When the trackmaker is finished, have the other partner open his/her eyes and follow the tracks, trying to explain what movements were used. Change roles if you like. Try to create several different track stories.

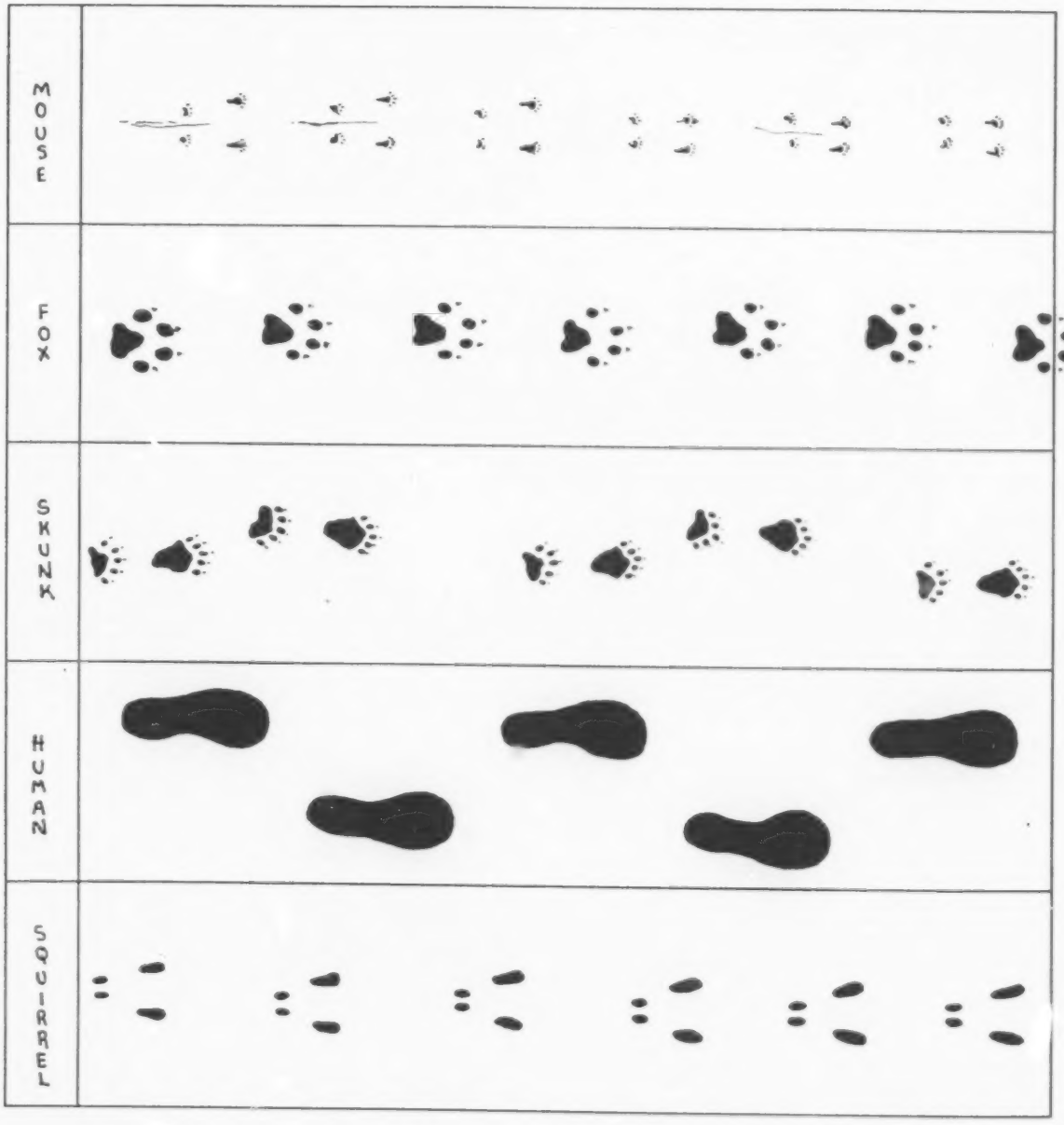
Track Search

Search for animal tracks in the snow. The illustrations on the next two pages may help you identify the tracks you find. Follow the tracks if you can, but do not scare the animal if you find it. Try to figure out what activity took place.

Wolf Tracks

If you have a few people in an area with at least a few inches of snow, you can try to travel like a wolf in the snow. Wolves are perfect steppers, each back foot lands in the footprint they have made with the front foot. First select a leader. This leader wolf should go for a walk, making regular footprints in the snow. One

TRACKS IN THE SNOW



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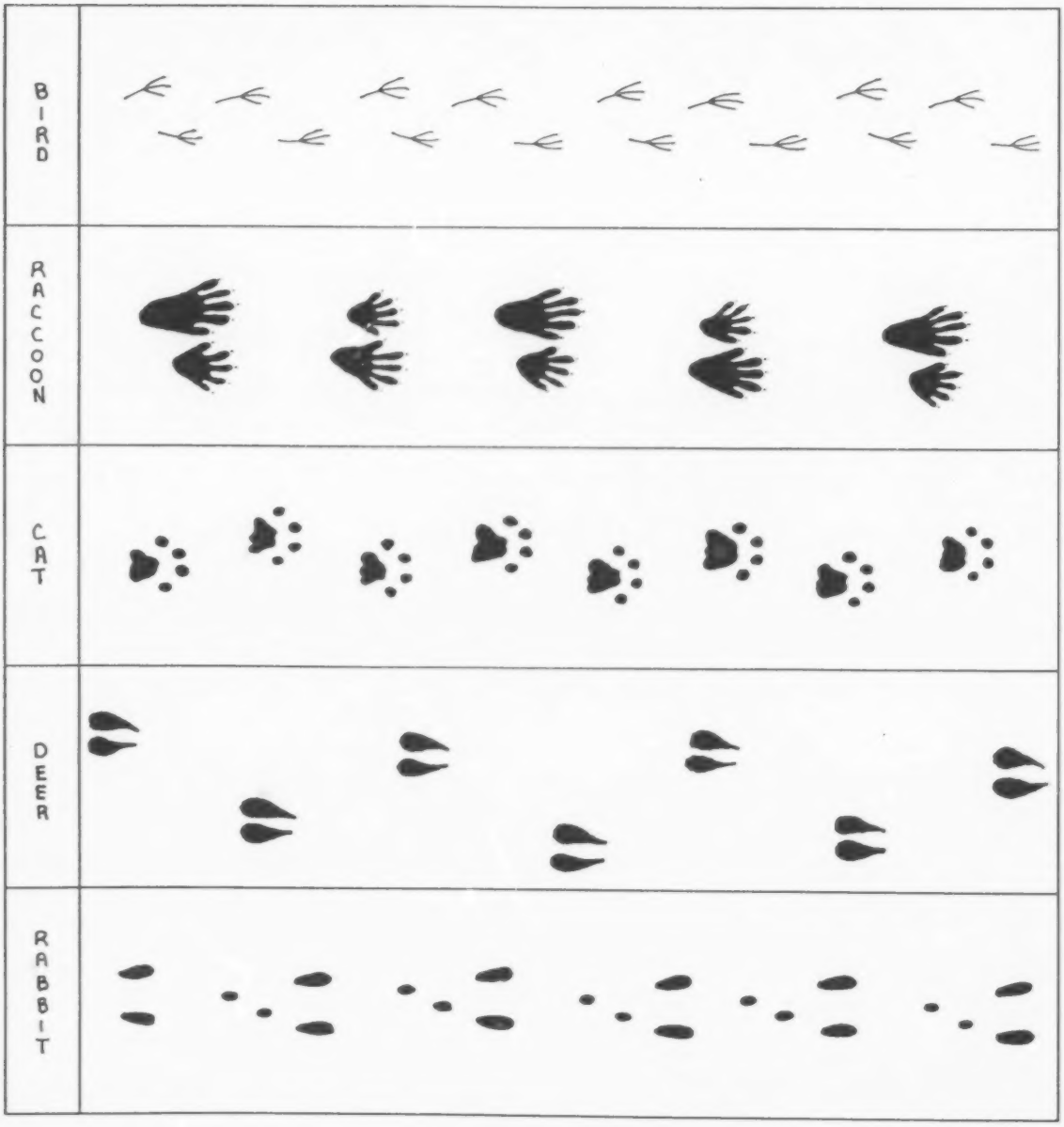
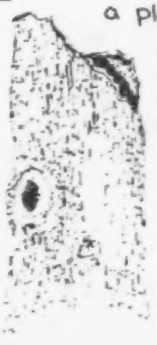
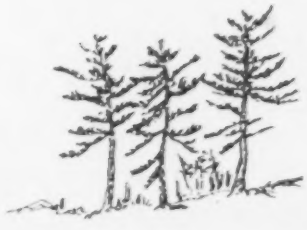
TRACKS IN THE SNOW



snow SCAVENGER HUNT

melting snow	tracks	a snowflake
clouds	something alive	a track story
a place where an animal could find shelter in a snowstorm 	something green 	something an animal could eat

by one, each other wolf should follow the leader by stepping precisely in the original footprints. It is much easier to travel this way through areas of deep snow, which is exactly why wolves, as well as other animals, do this. Many animals will travel in the tracks of other species, along trails, or on roads simply because it requires less energy than traveling through deep snow.

Snow Scavenger Hunt

Go out on a walk when there is snow on the ground and try to find some of these things.

Snow Shelters

Look for animal homes in the snow. See if you can find holes, tunnels, entries, or other ways animals might be getting into snow- covered homes. Follow any tunnels or paths you can find. Guess who might be using these entries and pathways. Quite often, small mammals use entries that are about the same size they are, preventing larger, possibly predatory, animals from entering.

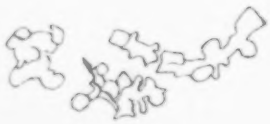
Try to build your own snow shelter. Line it with dried leaves and grasses for warmth. Imagine living in this snow shelter all winter long.

Catching Snowflakes

Catch falling snowflakes on a dark piece of fabric, such as a jacket sleeve, or a dark piece of paper. Try to identify which type of crystals are falling. Here are seven common types of snowflake crystals.

hexagonal columns

spatial dendrites



irregular crystals

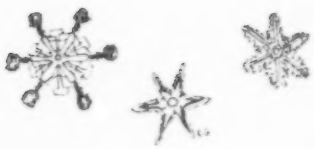
Meltdown

Fill a coffee can to the rim with snow and bring it inside. When the snow melts, mark the water level. Bring the can of melted snow outside and let it freeze. Compare the appearance and volume of the snow, water, and ice. Try to determine how may cups of snow are needed to make a cup of water. Measure which melts faster—an ice cube or a snowball of the same weight. Invent your own snow experiments.

needles

hexagonal plates

capped columns



stellar crystals

Record the results in your nature notebook.

Snow Measurements

Before a snowstorm, place measured sticks in your yard where you can see them but where they will not be in the way. After it snows, go out and mark the snow depth at each stick with a permanent marker. Compare the snow depth at each stick. If the depth differs, try to figure out what caused that difference. Keep the sticks out for a few weeks. Compare the depth markers as the snow melts. See if the snow melts at the same rate at each marker.

Snow Words

The Eskimos have fifteen words for snow and places where snow is found. Make up some of your own words for snow and snowy places.

Snow Story

Pretend you live in the snow and make up a story about it.

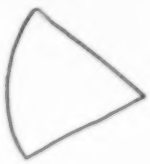
Make Paper Snowflakes

Snowflakes, like all crystals, are six-sided. You can create your own paper snowflakes.

Directions:

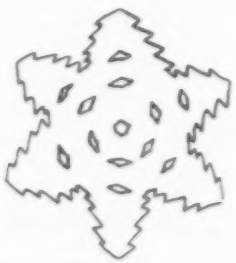
1. Take a white paper circle and fold it in half.

2. Fold the half circle in thirds.



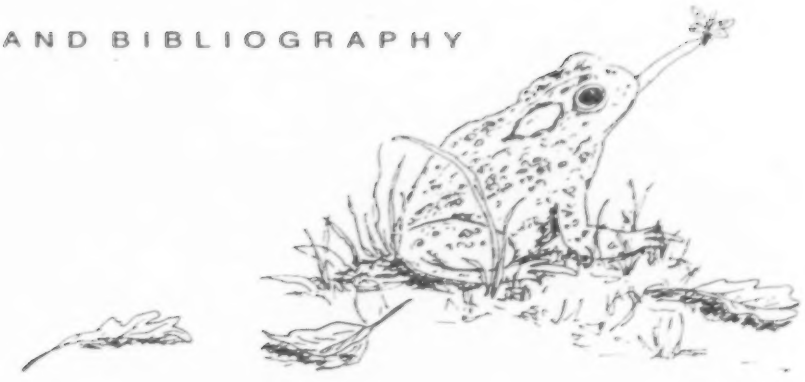
3. Make cuts with scissors on all the edges.

4. Carefully unfold your snowflake.

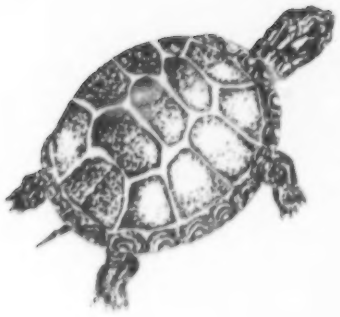


resources

ACTIVITIES AND BIBLIOGRAPHY



ACTIVITY LIST



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62 Autumn Scavenger Hunt
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69 Building a Warm Home
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